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HEAVY DUTY VEHICLE DRIVING PATTERN AND USE SURVEY:
PART II. LOS ANGELES BASIN

Wilbur Smith and Associates

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**HEAVY DUTY VEHICLE
DRIVING PATTERN AND USE SURVEY:
PART II - LOS ANGELES BASIN
FINAL REPORT**

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
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**HEAVY DUTY VEHICLE
DRIVING PATTERN AND USE SURVEY**

PHASE I

FINAL REPORT

PART II

LOS ANGELES BASIN

Prepared For
**ENVIRONMENTAL PROTECTION AGENCY
AND
COORDINATING RESEARCH COUNCIL, INC.**

APRAC CAPE 21-71

By

Wilbur Smith and Associates

FEBRUARY 1974

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Chapter 1

INTRODUCTION

This report presents data collated from various sources which identify the composition, function, and travel behavior of urban truck travel in the Los Angeles Basin. From these data, various stratifications have been organized to permit the characterization of the mission, function, and use patterns of trucks operating over urban streets. These stratifications are to be employed to develop representative truck use patterns for development of emission tests.

The study is Phase I of a two-phase program jointly undertaken by the Environmental Protection Agency and the Coordinating Research Council, Inc., under contract CRC APRAC Project No. CAPE-21-71 (1-72). The study objective was to assemble these data for both the Los Angeles Basin and New York City areas from existing data sources. However, data related to the Los Angeles Basin were not in the same descriptor form and dimension as that pertaining to New York City. Direct comparisons between the two data sets therefore proved to be inconclusive. For the statistical design of a single sampling plan, it was desirable to bring the two data together under common terms. While additional survey activity was recommended to accomplish this objective, it was decided to employ a specially prepared data tape derived from the 1967 Census of Transportation/Truck Inventory and Use Survey conducted by the Bureau of the Census, U. S. Department of Commerce. Results and conclusions of this data analysis effort are given in Chapter 5.

Because of the pressing need for data to proceed with Phase II of the program, it was decided to publish the final report for Phase I in two parts. Part I was published in May 1973 and reported truck pattern and use data related to New York City⁽¹⁾. Part II, represented by this document, reports data related to the Los Angeles Basin.

Phase II of the program is being undertaken as a separate contract. This element will select and stratify heavy-duty vehicles for the purpose of instrumenting and operating a small, economical sample of trucks representative of the total truck population in selected urban areas. Trucks in this controlled sample will be instrumented and operated in normal fashion to collect detailed operating profile data of truck operation not now available in existing data. Data to be recorded in Phase II include engine speed (rpm), wheel horsepower, vehicle speed (mph), engine temperature, throttle valve closure, road type and traffic condition. These data will be sampled at a rate of one data set each 0.8-second interval and recorded in BCD on magnetic tape for data processing and statistical analysis.

The Phase I effort was divided into four tasks:

Task 1. Orientation and Available Information - This effort was the identification and collection of available information on urban trucks and truck usage from existing literature, vehicle registration records, urban truck weight (loadometer) studies, comprehensive urban area transportation planning studies, fleet operator statistics and other available data sources for the Los Angeles and New York City areas.

-2-

(1) Wilbur Smith and Associates, "Heavy Duty Vehicle Driving Pattern and Use Survey/Final Report Part I--New York City" for EPA and CRC, APTD--1523, May 1973

Task 2. Analysis of Vehicle Characteristics and Truck Use Variables - Meaningful characteristics of the urban truck population were to be assembled from the information assembled in Task 1 by detailed stratification and analysis to define steps which can be safely taken to reduce and simplify the number of meaningful categories of trucks and the kinds of travel they perform.

Task 3. Analysis of Truck-Use Patterns - The travel performed by each of the major classes of vehicles defined in Task 2 were examined in relation to place and time and time of use, type of street traveled, place and length of time at rest, vehicle miles of travel by geographic unit of area and of street type, and the type of land-use traversed. Two general sets of data resulted--the general characteristics of truck use and the spatial patterns of truck use on the street network.

Task 4. Data Deficiencies and Requirements - In the process of assembly and analysis of available data, additional information were identified as needed to improve the analysis. This task identified the kinds of information still required and the likely sources or methods of acquiring it were described in detail.

Data Sources for the Los Angeles Basin

Various data sources are identified for this area as summarized in Appendix A. All sources of data were examined and it was determined that the 1960 Truck Survey was the data source which would provide sufficient depth and quality to be utilized for

obtaining detailed truck-use patterns. The survey data included basic truck characteristics such as number of axles and empty weight as well as extensive origin-destination data for a typical day. These truck data were available only in their raw interview form and some work was required to transform the information into data sets for manipulation. In addition, the origin-destination data were coded by coordinates and a special program was used to identify the locations by traffic zone. This enabled the survey data to be used in conjunction with a detailed highway network for the study area.

A complementary source of information to the 1960 truck survey is a thesis by Les Hoel based on some of the survey results. Many of the truck-use relationships in this thesis have been helpful in assisting the analysis of the 1960 survey.

In 1967, there was a household interview survey, conducted of driver trips and trip purposes. Unfortunately, all truck driver trips were grouped together and it was not possible to stratify the data in any significant or meaningful way for the purposes of this study. After careful examination it was decided therefore to discontinue the use of this data.

Besides the survey data, two other sets of information have been used. These are vehicle registration files of the California Department of Motor Vehicles, and the vehicle classification surveys along roadways conducted by the California Division of Highways.

The 1971 truck registration data were used to define and stratify the present population of trucks. They were also the

only source of information on the engine-type (i.e. fuel) used in the different types of trucks. These data are summarized later in this report.

One particular area of concern is the difficulty in relating truck registration data to truck survey data. Truck registration data contains information by components (e.g. tractor, trailer, etc.) whereas truck survey and counting data is recorded by combinations. This problem is discussed in Chapter 4. While the relationships between truck use as contained in the LARTS survey and registration data can be estimated and extrapolated, such procedures are less accurate than direct data correlations. For instance, the survey indicates travel by vehicles described as 2-, 3- and 4- or more axle types without directly identifying whether the vehicle is a single unit or a combination (tractor-semitrailer, truck-full trailer, etc.). Truck population registration distributions between truck type as defined by single unit/combination and number of axles can be applied to trip making characteristics to infer an assignment of miles of travel, number of trips, trip length, etc. More direct data relationships would be desired but would require generation of new data.

A major difference appears when comparing New York and Los Angeles data. Following local regulatory practices, New York data employs the term "Gross Vehicle Weight", while Los Angeles data is in terms of "Empty Weight". This makes direct comparison of truck use using this descriptor difficult, if not impossible.

A third limitation is the descriptor of vehicle user. New York survey material divided the data into 11 categories of user industry groups. Los Angeles data is collected under two broad categories--"Board of Equilization (B.E.)" trucks which are for-hire vehicles, and "Regular Commercial (R.C.)" trucks which are all others.

One possible source of data which could have permitted a more direct comparison of trucks in the two areas was the 1967 Census of Transportation/Truck Inventory and Use Survey. The "Public Use Tapes" for this survey were not suitable for this purpose, however, and special tapes had to be prepared by the Bureau of Census to add data on survey files not included in these standard tapes.

Report Organization

Chapter 2 describes the scope and composition of the truck population in the Los Angeles Basin, employing registration records of the California Department of Motor Vehicles. Data concerning trucks on a component basis in terms of number of axles, empty weight, body type and fuel is presented.

Basic truck usage and their relationship to the total population of trucks in the basin is established in Chapter 3. The identification of significant truck classifications and the factors describing their usage, the proportion of the truck population actually in use at a typical point in time, and the travel characteristics of significant truck classes in their daily trip-making activity are major points of emphasis in this chapter.

Geographic characteristics of truck usage in the Los Angeles Basin are developed in Chapter 4. Comparisons are made among distribution of trucks by vehicle type, the types of roadways and their relationships to overall land use in the region to provide an understanding of truck operations and to permit development of representative truck-use patterns.

The results of the processing of the 1967 Census of Transportation data are presented in Chapter 5. In this task, empty weight was treated as the dependent variable, assuming that trucks in Los Angeles and New York had identical characteristics other than registered weight format. Correlations of data from other states in the census were also attempted. Results of this regression analysis are reported.

The conclusions resulting from the study in Los Angeles Basin are provided in Chapter 6.

Chapter 2

CHARACTERISTICS OF THE TRUCK POPULATION LOS ANGELES BASIN

This chapter describes the scope and composition of the truck population in the Los Angeles Basin. The major source of these data are the registration records of the California Department of Motor Vehicles. Detailed information is available on an annual basis which describes the statewide truck population on a component basis in terms of number of axles, empty weight and body type. In addition, a summary of all body types and type of motive power (i.e., fuel) is available.

While these truck stratifications are provided for the State as a whole, only the total number of truck components are available on a county basis. Therefore, it was necessary to derive a stratified truck population of the Los Angeles Basin by applying the statewide distributions to the totals of the five counties comprising the Los Angeles Basin. The soundness of this procedure was discussed with individuals in the California Department of Motor Vehicles and is considered statistically valid. A major reason for this, as will be seen, is the fact that over one-third of all truck components in California are registered in the Los Angeles Basin counties.

It should be re-emphasized that the truck population is available from registration records on a component basis and there is no indication of how the components are actually used. This is because each individual truck unit, whether it is the motive section or the trailer accessory, is registered and licensed separately.

This poses a constraint in using the truck population data to develop representative truck-use patterns for combinations of components, since the only comprehensive data on truck usage in the Los Angeles Basin comes from a 1960 survey of truck combinations. The data did not include the component composition of trucks and, therefore, there is not a direct linkage between the population and survey data. How the relationship between components and combinations can be estimated is given in Chapter 4 where results of truck classification counts are presented.

The main focus of this study is upon trucks over 6,000 lbs. in empty weight. These include all heavy commercial vehicles having 3 or more axles and a sizeable proportion of 2-axle trucks, usually with 6 or more tires. All trailer components are included in the analysis since any size trailer can actually be used with heavy commercial trucks. Excluded from the analysis are certain types of commercially registered trucks and trailers which do not fall into the definition of trucks understood for

this study. The specific exclusions are indicated in the following discussion.

Overview of Truck Population

The total truck and trailer population for the Los Angeles Basin is summarized in Table 1 for both 1959 and 1971. Comparison data is also given to the State of California. As can be seen, in excess of one-third of all trucks and trailers have been registered in the Los Angeles Basin.

Throughout this analysis, comparisons are drawn between the 1959⁽¹⁾ and 1971 truck characteristics. It is seen in Table 1 that the total number of trucks and trailers have nearly doubled since 1959. The numbers for every county except Los Angeles have more than doubled, particularly in Orange County where the increase for both trucks and trailers was over 300 percent. The individual county increases reflect factors such as the increase in population and the spreading-out of business activity.

Trucks (over 6,000 lbs.) and Trailers in the Los Angeles Basin

The figures in Table 1 showed the total population of registered trucks and trailers. These amounts include many vehicles, particularly trucks under 6,000 lbs., that are not of

(1) The 1960 LARTS Truck Study was based on a sample of the 1959 truck population.

TABLE 1
TOTAL TRUCK AND TRAILER REGISTRATIONS IN THE
LOS ANGELES BASIN COUNTIES

1959 and 1971

<u>COUNTY</u>	1959		1971	
	<u>TRUCKS</u>	<u>TRAILERS</u>	<u>TRUCKS</u>	<u>TRAILERS</u>
Los Angeles	286,241	222,649	490,771	300,365
Orange	28,605	29,238	102,377	102,047
Riverside	20,744	21,171	48,039	56,231
San Bernadino	29,164	28,581	68,897	58,518
Ventura	<u>12,413</u>	<u>11,846</u>	<u>32,835</u>	<u>27,061</u>
TOTAL	377,167	313,485	742,919	544,222
STATE OF CALIFORNIA	928,153	717,765	1,835,260	1,418,022

SOURCE: 1959 and 1971 Annual Reports, Number of Vehicles Registered, California Department of Motor Vehicles

concern in this study. In order to derive the desired totals and stratifications, the statewide distribution of trucks and trailers was analyzed. The types of vehicle excluded in the analysis were the following:

1. All trucks under 6,000 lbs. empty weight.
2. All trucks and trailers registered as bus, camping, trailer, military, taxi, trailer coach and special equipment.

Detailed stratifications were then developed from the statewide registration data and applied to the Los Angeles Basin.

Trucks and trailers in California are classified as either "B. E. commercial" or "regular commercial". B. E. commercial trucks and trailers are those subject to a tax levied by the California State Board of Equalization on vehicles which are used on a for-hire basis for the transportation of persons or property. Certain exemptions are allowed, mainly to vehicles whose movements are confined within contiguous boundaries of incorporated cities and private land. The primary use of these vehicles is for the movement of goods.

Throughout most of the analysis work in this study, B. E. and regular commercial trucks have been treated separately. Tables 2 and 3 show the 1959 and 1971 truck and trailer

TABLE 2

SUMMARY OF B. E. AND REGULAR
COMMERCIAL TRUCKS (OVER 6,000 LBS.) AND TRAILERS
IN THE LOS ANGELES BASIN, BY AXLE CLASS

1959

<u>TRUCKS</u>	<u>B. E. COMMERCIAL</u>	<u>REGULAR COMMERCIAL</u>	<u>TOTAL</u>
2-axle	16,696	48,085	64,781
3-axle	8,488	6,192	14,680
4-axle	<u>16</u>	<u>6</u>	<u>22</u>
Subtotal	25,200	54,283	79,483
<u>TRAILERS</u>			
1-axle	11,646	102,720	114,366
2-axle	12,408	14,464	26,872
3-axle	602	279	881
4-axle	<u>9</u>	<u>6</u>	<u>15</u>
Subtotal	24,665	117,469	142,134
TOTAL	49,865	171,752	221,617

SOURCE: Derived from 1959 Gross Report, California Department of Motor Vehicles.

TABLE 3

SUMMARY OF B. E. AND REGULAR
COMMERCIAL TRUCKS (OVER 6,000 LBS.) AND TRAILERS
IN THE LOS ANGELES BASIN, BY AXLE CLASS

1971

<u>TRUCKS</u>	<u>B. E. COMMERCIAL</u>	<u>REGULAR COMMERCIAL</u>	<u>TOTAL</u>
2-axle	22,436	69,108	91,544
3-axle	12,235	8,921	21,156
4-axle	<u>157</u>	<u>76</u>	<u>233</u>
Subtotal	34,828	78,105	112,933
<u>TRAILERS</u>			
1-axle	26,209	103,822	130,031
2-axle	23,481	31,052	54,533
3-axle	229	504	733
4-axle	<u>25</u>	<u>15</u>	<u>40</u>
Subtotal	49,944	135,393	185,337
TOTAL	84,772	213,498	298,270

SOURCE: Derived from 1971 Gross Report, California Department
of Motor Vehicles.

populations for the Los Angeles Basin separated in this way.

Regular commercial vehicles are all those not in the B. E. commercial category. Their primary use is also for the movement of goods, but significant differences exist between regular commercial and B. E. truck usage. This is partially evident by the truck components in the two fleets. The breakdown of regular commercial and B. E. commercial trucks and trailers by axle group in Tables 2 and 3 shows that, although there are a greater number of commercial truck components, there is a significantly larger proportion of the heavier truck components registered as B. E. commercial. The heavier components suggest a different pattern of usage in the movement of heavier-type goods.

The data indicate that the majority of regular commercial truck operations consist of a single-unit, two-axle truck while in B. E. commercial operations there is a large number of truck and trailer combinations. This suggests that B. E. commercial trucks are probably used in combination with trailers to a much greater degree than regular commercial trucks.

Comparison of Tables 2 and 3 shows that there has been about a one-third increase in the total number of trucks (over 6,000 lbs.) and trailers in the Los Angeles Basin. The increase was slightly greater for truck components than for trailer components. The overall number of B. E. and regular

commercial truck components increased by about the same proportion over the 1959 levels. By axle class, the 2- and 3-axle truck components increased about the same for both groups while the proportion of 4- axle components increased dramatically, also for both truck groups.

The largest proportional increase in the number of trailer components occurred for B. E. trailers where the number more than doubled. The percentage increase in B. E. trailers was about the same for the 1-, 2- and 4- axle classes while the number of 3- axle trailers actually declined by about 50 percent. Most increases of regular commercial trailers were small except for 2- axle trailers which more than doubled.

Vehicle Composition of Truck Groups

The difference between the B. E. and regular commercial truck groups is explained further by the vehicle body types in each group. Using the 1971 data for comparison, Table 4 shows how a majority of B. E. trucks are tractors whose primary function is to pull trailers. In contrast, only a little more than 10 percent of the regular commercial trucks are tractors while flatbeds and vans comprise over half the trucks in this group.

The difference between the B. E. and regular commercial truck groups carry over to the different compositions of trailers in each group. Table 5 contains the 1971 breakdown of trailers

TABLE 4
PERCENTAGE DISTRIBUTION OF B. E. AND REGULAR
COMMERCIAL TRUCKS BY AXLE CLASS WITHIN BODY TYPE

1971

VEHICLE BODY TYPE	B. E. TRUCKS (OVER 6,000 LBS.)				REGULAR COMMERCIAL TRUCKS (OVER 6,000 LBS.)			
	2-Axle	3-Axle	4-Axle	Total	2-Axle	3-Axle	4-Axle	Total
Dump	2.4	15.0	.6	6.9	10.2	20.6	-	11.7
Panel Delivery	.8	(1)	-	.6	1.0	(1)	-	1.0
Flatbed	10.6	8.5	.2	9.6	41.5	20.6	1.0	39.3
Tractor	55.0	50.6	1.3	53.7	9.0	32.0	-	11.5
Chassis	.9	(1)	-	.6	.8	.2	-	.7
Tank	1.8	5.1	.3	3.0	3.4	8.2	.8	3.8
Log Bunk	.3	9.3	-	2.8	.3	.8	-	.6
Transit Mix	(1)	7.4	96.5	3.1	(1)	9.3	94.2	1.2
Pickup	.3	.2	-	.3	1.2	.5	-	1.1
Refrigeration	.4	(1)	.6	.3	4.5	1.5	-	4.1
Station Wagon	(1)	-	-	(1)	(1)	(1)	-	(1)
Van	23.7	.6	-	15.7	23.4	3.0	-	21.0
Transport	.7	2.3	-	1.2	.2	.2	1.3	.2
Miscellaneous	3.1	1.1	.5	2.3	3.7	3.4	1.7	3.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL NUMBER	22,436	12,235	157	34,828	69,108	8,921	76	78,105

(1) Indicates less than 0.1 percent

SOURCE: 1971 Gross Report, California Department of Motor Vehicles.

TABLE 5

PERCENTAGE DISTRIBUTION OF B. E. AND REGULAR
COMMERCIAL TRAILERS BY AXLE CLASS WITHIN BODY TYPE

1971

VEHICLE BODY TYPE	B. E. TRAILERS (ALL WEIGHTS)					REGULAR COMMERCIAL TRAILERS (ALL WEIGHTS)				
	1-Axle	2-Axle	3-Axle	4-Axle	Total	1-Axle	2-Axle	3-Axle	4-Axle	Total
Dump	9.2	18.1	2.2	-	13.3	2.2	8.5	3.8	5.1	3.9
Panel Delivery	-	-	-	-	-	-	-	-	-	-
Flatbed	18.9	31.2	75.5	59.1	25.0	26.3	25.6	62.4	46.2	26.7
Tractor	.1	.1	.2	-	.1	.1	.2	.3	-	.1
Chassis	-	.5	-	-	.2	.1	.2	.6	-	.1
Tank	1.8	5.1	1.8	1.5	3.4	1.1	1.3	1.3	-	1.9
Log Bunk	18.0	4.7	9.9	13.6	11.7	2.2	4.7	4.6	7.7	2.0
Transit Mix	-	-	-	-	-	.5	8.4	1.2	2.6	.1
Pickup	.1	.2	.3	-	.1	46.5	4.1	-	7.7	37.6
Refrigeration	1.2	4.6	1.0	-	2.8	4.1	6.6	.3	-	1.3
Station Wagon	-	-	-	-	-	-	-	-	-	-
Van	48.8	23.6	3.0	10.6	36.7	8.3	5.2	1.9	-	4.9
Transport	.8	1.1	1.7	-	.9	1.0	5.2	11.3	-	8.6
Miscellaneous	1.1	10.9	4.4	15.2	5.8	7.7	30.0	12.7	30.7	12.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL NUMBER	26,209	23,481	229	25	49,944	103,822	31,052	504	15	135,393

(1) Indicates less than 0.1 percent.

SOURCE: 1971 Gross Report, California Department of Motor Vehicles.

by vehicle body type. The greatest differences are seen in the relatively larger proportions of dump, log bunk and van types in the B. E. group. In contrast, the largest proportion in the regular commercial group are pickup trailers.

The trends in the composition of the two truck groups can be seen by relating the vehicle body type compositions for 1959 in Tables 6 and 7 with the present compositions in Table 4 and 5

Focusing on truck compositions first, it is seen that only a slight shift occurred in the B. E. group. Specifically, the proportion of flatbeds decreased along with dumps while the proportion of tractors increased by about the same amount. The regular commercial truck group experienced a slight decrease in the percentage of flatbeds while the percentage of vans nearly doubled. Otherwise, the two groups have maintained the same basic composition of truck components since 1959.

The composition of B. E. trailers has shifted only slightly since 1959 as is seen by comparing Tables 5 and 7. The basic changes have been about a 13 percent decrease in the proportion of flatbeds versus a slightly lower increase in the proportion of van trailer components. The regular commercial trailer group has experienced a large proportional decrease in pickup trailers, although they are still the largest proportion.

TABLE 6

PERCENTAGE DISTRIBUTION OF B. E. AND REGULAR
COMMERCIAL TRUCKS BY AXLE CLASS WITHIN BODY TYPE

1959

VEHICLE BODY TYPE	B. E. TRUCKS (OVER 6,000 LBS.)				REGULAR COMMERCIAL TRUCKS (OVER 6,000 LBS.)			
	2-Axle	3-Axle	4-Axle	Total	2-Axle	3-Axle	4-Axle	Total
Dump	5.9	19.4	-	10.4	11.6	15.6	-	12.1
Panel Delivery	1.0	.3	-	.8	3.0	.3	-	2.7
Flatbed	22.4	15.4	20.0	47.4	36.8	25.8	16.7	44.9
Tractor	40.1	34.1	100.0	38.2	9.3	18.0	-	10.3
Chassis	.3	.2	-	.3	.5	1.2	-	.6
Tank	4.4	7.5	-	5.4	3.8	10.0	16.7	4.5
Log Bunk	.9	12.0	-	4.6	.5	8.6	16.7	1.4
Transit Mix	.2	7.9	-	2.8	.2	15.5	-	1.9
Pickup	.4	.2	-	.3	1.3	.4	-	1.2
Refrigeration	.3	.1	-	.2	4.5	.5	-	4.0
Station Wagon	(1)	(1)	-	(1)	(1)	(1)	-	(1)
Van	19.0	.8	-	12.9	14.0	4.0	16.7	12.9
Transport	1.4	(1)	-	.9	(1)	(1)	-	(1)
Miscellaneous	3.6	2.0	-	3.1	3.6	-	33.2	3.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL NUMBER	16,696	8,488	16	25,200	48,085	6,192	6	54,283

(1) Indicates less than 0.1 percent.

SOURCE: 1959 Gross Report, California Department of Motor Vehicles.

TABLE 7

PERCENTAGE DISTRIBUTION OF B. E. AND REGULAR
COMMERCIAL TRAILERS BY AXLE CLASS WITHIN BODY TYPE

1959

VEHICLE BODY TYPE	B. E. TRAILERS (ALL WEIGHTS)					REGULAR COMMERCIAL TRAILERS (ALL WEIGHTS)				
	1-Axle	2-Axle	3-Axle	4-Axle	Total	1-Axle	2-Axle	3-Axle	4-Axle	Total
Dump	6.5	11.5	.9	8.0	9.2	1.4	6.1	1.5	15.0	2.0
Panel Delivery	-	-	-	-	-	-	-	-	-	-
Flatbed	29.8	44.5	72.7	68.0	38.2	22.0	49.1	63.6	40.0	25.0
Tractor	.4	(1)	.8	-	.2	.1	.2	.2	-	.1
Chassis	.1	(1)	(1)	-	(1)	.2	1.1	.3	-	.3
Tank	3.9	8.3	5.9	4.0	6.2	.8	6.0	7.6	15.0	1.4
Log Bunk	12.7	9.4	9.6	4.0	10.9	1.4	4.0	9.2	10.0	1.7
Transit Mix	(1)	(1)	(1)	-	(1)	(1)	(1)	-	-	(1)
Pickup	.4	.2	.1	-	.3	61.8	10.2	1.4	-	54.2
Refrigeration	1.0	1.5	.4	-	1.2	.2	.7	.5	-	.3
Station Wagon	-	-	-	-	-	-	-	-	-	-
Van	39.3	20.4	4.6	-	28.8	2.3	9.4	4.2	10.0	3.2
Transport	2.8	.8	.7	-	1.7	1.0	1.3	.6	-	3.3
Miscellaneous	3.1	3.2	4.2	16.0	3.2	8.7	11.4	10.9	10.0	9.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
TOTAL NUMBER	11,646	12,408	602	9	24,665	102,720	14,464	279	6	117,469

(1) Indicates less than 0.1 percent.

SOURCE: 1959 Gross Report, California Department of Motor Vehicles.

The increases resulting from this percentage decrease in pickup trailers were distributed about evenly over the other trailer components.

Motive Power of Truck Components

The Department of Motor Vehicles in California obtains information of the type of motive power (i.e., fuel) used by registered truck components. The data are available on the basis of vehicle body type for both B. E. and regular commercial trucks. Table 8 summarizes the present distribution of motive power by vehicle body type with comparisons between the B. E. and regular commercial truck groups.

A large difference is seen between the distribution of motive power for all types of trucks in each truck group. Overall, there are a slightly greater proportion of gas-driven trucks than diesel-driven trucks in the B. E. group. In contrast, practically all of the regular commercial trucks are gas-driven. As seen in Table 8, only a small proportion of trucks for either group are butane-, electric-or propane- driven.

It might be thought that the difference seen in the distribution of motive power between the truck groups is due solely to the different composition of vehicle body types identified earlier. This is not the case, though, since it is seen in Table 8 that there are distinct differences in the distribution

TABLE 8
DISTRIBUTION OF TRUCK VEHICLE BODY TYPE
BY SOURCE OF MOTIVE POWER

1971

VEHICLE BODY TYPE	B. E./ REGULAR COMMERCIAL	MOTIVE POWER					Total
		Butane	Diesel	Electric	Gas	Propane	
Dump	B. E.	(1)	46	-	54	(1)	100
	R. C.	(1)	8	-	92	(1)	100
Panel Delivery	B. E.	-	(1)	-	100	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Flatbed	B. E.	(1)	21	-	79	(1)	100
	R. C.	(1)	1	(1)	99	(1)	100
Tractor	B. E.	(1)	76	(1)	24	(1)	100
	R. C.	(1)	53	-	46	1	100
Chassis	B. E.	(1)	12	-	88	-	100
	R. C.	(1)	3	-	97	(1)	100
Tank	B. E.	(1)	58	-	42	(1)	100
	R. C.	2	15	-	80	3	100
Log Bunk	B. E.	(1)	91	-	9	-	100
	R. C.	-	44	-	56	-	100
Transit Mix	B. E.	1	71	-	28	-	100
	R. C.	(1)	42	-	58	-	100
Pickup	B. E.	(1)	2	-	98	(1)	100
	R. C.	(1)	(1)	(1)	100	(1)	100
Refrigeration	B. E.	-	26	-	74	(1)	100
	R. C.	(1)	3	-	97	-	100
Station Wagon	B. E.	-	1	-	99	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Van	B. E.	(1)	11	-	89	(1)	100
	R. C.	(1)	1	-	99	(1)	100
Transport	B. E.	-	44	-	56	-	100
	R. C.	-	5	-	95	(1)	100
Miscellaneous	B. E.	(1)	6	-	94	(1)	100
	R. C.	(1)	2	(1)	98	(1)	100
ALL TYPES	B. E.	(1)	47	-	53	(1)	100
	R. C.	(1)	1	(1)	99	(1)	100

(1) Indicates less than 0.5 percent.

SOURCE: 1971 Gross Report, California Department of Motor Vehicles.

motive power between the truck groups even within body types. In every case except panel delivery and pickup trucks, the proportion of B. E. diesel-driven trucks is much higher than the relative proportion of regular commercial trucks.

The change since 1959 in the distribution of motive power can be seen by comparing the figures in Tables 8 and 9. During the period, there was a large increase in the proportion of all B. E. commercial trucks using diesel-driven engines. On the other hand, there was little overall change for regular commercial trucks.

Large increases in the proportion of B. E. trucks using diesel power occurred for all vehicle body types except panel delivery and station wagons. In the regular commercial truck group, some proportional increases occurred in the percentage of diesel-driven trucks by vehicle body types, but did not affect the overall distribution of motive power.

Overall Weight Characteristics of Trucks and Trailers

In the foregoing analysis, it has been shown that there are several basic differences between the B. E. and regular commercial truck and trailer populations. In terms of size, the truck groups differ in their distributions of truck and trailer components by number of axles. Significant differences

TABLE 9
DISTRIBUTION OF TRUCK VEHICLE BODY TYPE
BY SOURCE OF MOTIVE POWER

1959

VEHICLE BODY TYPE	B. E./ REGULAR COMMERCIAL	MOTIVE POWER					Total
		Butane	Diesel	Electric	Gas	Propane	
Dump	B. E.	(1)	6	-	94	(1)	100
	R. C.	(1)	1	(1)	99	(1)	100
Panel Delivery	B. E.	-	1	-	99	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Flatbed	B. E.	(1)	10	-	90	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Tractor	B. E.	1	43	-	57	(1)	100
	R. C.	(1)	15	-	85	(1)	100
Chassis	B. E.	-	7	-	93	-	100
	R. C.	(1)	1	-	99	-	100
Tank	B. E.	1	35	-	64	(1)	100
	R. C.	1	7	-	91	1	100
Log Bunk	B. E.	1	68	-	31	-	100
	R. C.	(1)	35	-	65	(1)	100
Transit Mix	B. E.	(1)	1	-	98	1	100
	R. C.	(1)	1	-	99	-	100
Pickup	B. E.	-	(1)	-	100	-	100
	R. C.	(1)	(1)	(1)	100	(1)	100
Refrigeration	B. E.	-	9	-	91	-	100
	R. C.	(1)	(1)	-	100	-	100
Station Wagon	B. E.	(1)	1	-	99	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Van	B. E.	(1)	1	-	99	-	100
	R. C.	(1)	(1)	-	100	(1)	100
Transport	B. E.	-	11	-	89	-	100
	R. C.	1	1	-	98	-	100
Miscellaneous	B. E.	(1)	9	-	91	-	100
	R. C.	(1)	(1)	(1)	100	(1)	100
ALL TYPES	B. E.	(1)	22	-	78	(1)	100
	R. C.	(1)	1	(1)	99	(1)	100

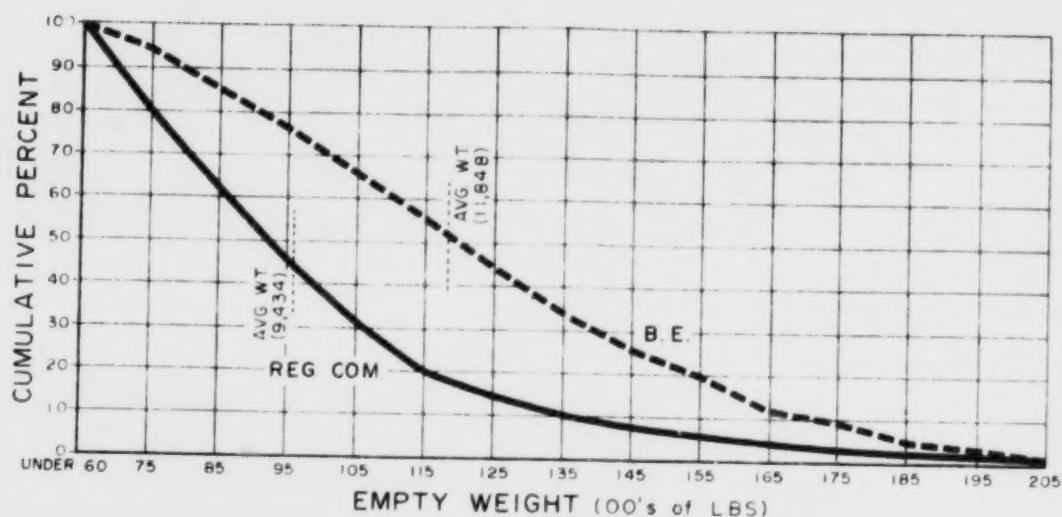
(1) Indicates less than 0.5 percent.

SOURCE: 1959 Gross Report, California Department of Motor Vehicles.

are also seen in the composition of the respective groups by vehicle body type. These differences are evident in the weight characteristics of the two groups. The present scale of difference is demonstrated for truck components in Figure 1 and trailer components in Figure 2.

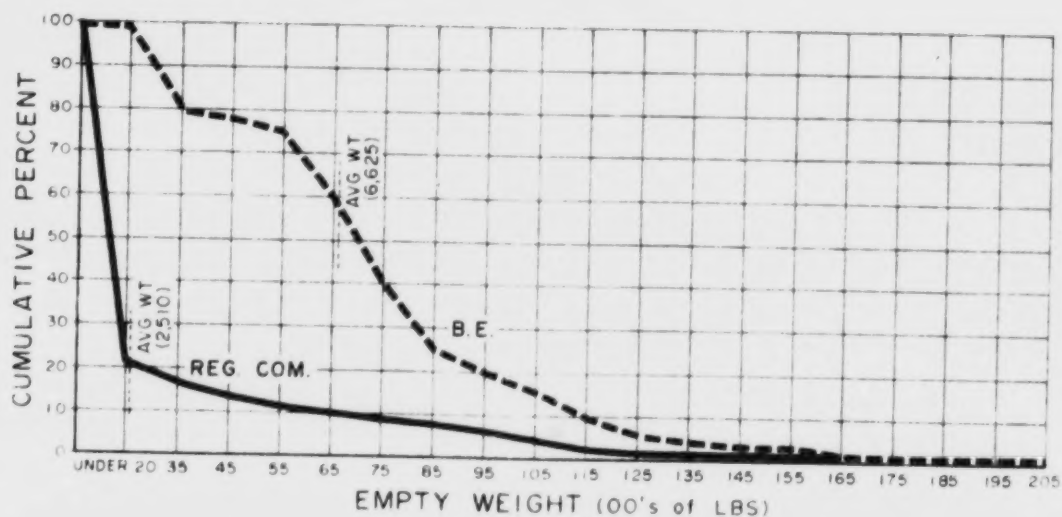
The weight distributions of truck components in Table 1 show the same range for B. E. and regular commercial trucks. The major difference is that the majority of regular commercial truck components are less than 9,500 lbs. in weight whereas nearly 80 percent of the B. E. trucks have a weight greater than 9,500 lbs. The shapes of the distributions in Figure 1 indicate a more balanced distribution of B. E. trucks between 6,000 and 20,000 lbs. These characteristics result in an average weight of 11,848 lbs. for B. E. trucks versus 9,434 for regular commercial.

The weight distributions of all trailers in Figure 2 show the same basic difference between the B. E. and regular commercial trailer populations as seen for trucks, namely, regular commercial trailers are concentrated at the lower end of the range whereas B. E. trailers are more evenly distributed by weight. The result here is that B. E. trailers have an overall average weight of 6,625 lbs. versus 2,510 lbs. for regular commercial trailers.



1971 DISTRIBUTION OF B. E. AND REGULAR COMMERCIAL TRUCK COMPONENTS BY WEIGHT

FIGURE 1



1971 DISTRIBUTION OF B. E. AND REGULAR COMMERCIAL TRAILER COMPONENTS BY WEIGHT

FIGURE 2

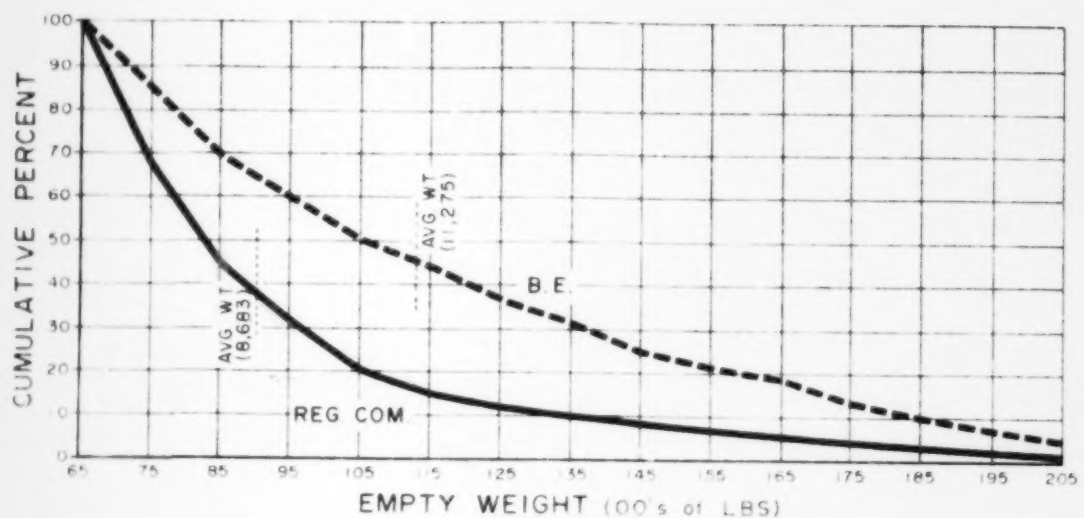
The trends in overall weight of trucks and trailers were examined by comparing the same data for 1959. Figures 3 and 4 contain the weight distributions of trucks and trailers and correspond to Figures 1 and 2. Examining trucks first, it is seen that the present weight relationship between the truck groups existed in 1959. Slight changes have occurred by way of small increases in the overall average weight of each truck group.

Similarly, there has been little change in the weight distributions of trailers since 1959. A slight increase has occurred for regular commercial trailers while B. E. trailers have experienced a slight decrease in overall average weight.

Thus, significant differences exist between the weight distributions of trucks and trailers in the two truck groups. In both cases, the B. E. group has the heaviest distribution of components.

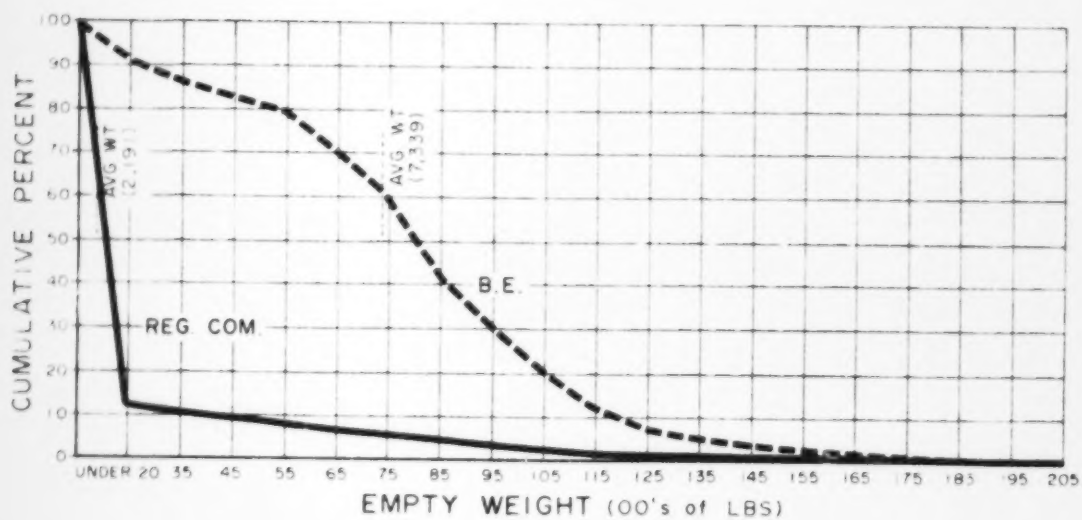
Relationship of Weight to Axle Classes of Trucks

Truck weight is generally understood to be correlated with the number of axles. For the purposes of this study, a detailed analysis of truck weight by axle class was conducted in order to establish the significant relationships between the two factors. The analysis sought to identify the characteristics most common to the truck population and to identify any differences between the B. E. and regular commercial truck groups. In



1959 DISTRIBUTION OF B. E. AND REGULAR COMMERCIAL TRUCK COMPONENTS BY WEIGHT

FIGURE 3



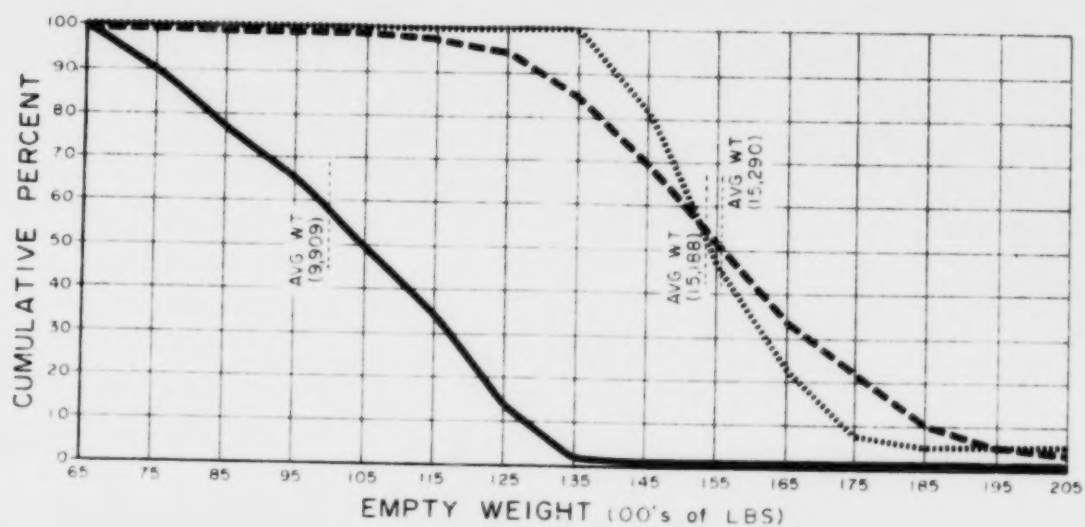
1959 DISTRIBUTION OF B. E. AND REGULAR COMMERCIAL TRAILER COMPONENTS BY WEIGHT

FIGURE 4

addition, the 1959 relationships were compared with the present in order to identify any significant trends in the relationships. The following discussion reviews the important points developed in the analysis.

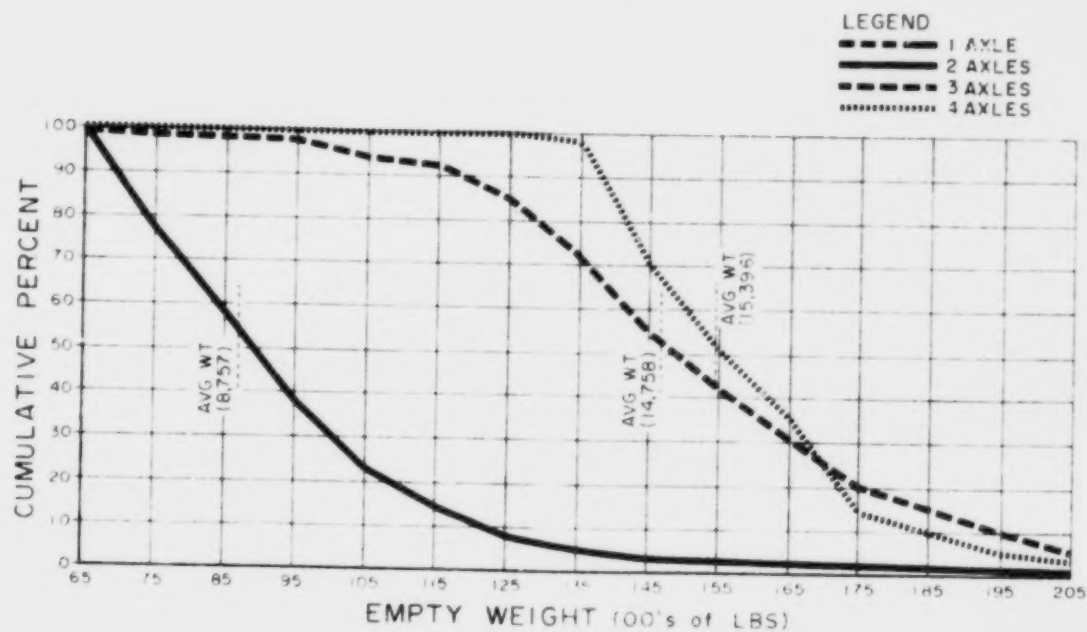
Figure 5 and 6 show the weight distributions of B. E. and regular commercial trucks by axle class. The most significant relationship exists between 2-axle trucks and the others. Almost all 2-axle trucks are fairly evenly distributed over the range from 6,000 to 13,500 lbs. for both the B. E. and regular commercial groups. The average weight of 2-axle B. E. trucks is 9,909 while the average for the regular commercial groups is 8,757 lbs. The difference can be accounted for in the greater proportion of the lighter weight vehicle types in the regular commercial group which was indicated earlier in this chapter.

Only small differences are seen in Figures 5 and 6 between the weight distributions of 3- and 4-axle truck components in both truck groups. In both cases, 3-axle trucks are more distributed across a wider weight range than 4-axle trucks, but there is little difference in their average weights. In comparison with the distinct weight relationship found for 2-axle trucks, the 3- and 4-axle trucks should be considered as having the same basic weight relationship.



1971 DISTRIBUTION OF B. E. TRUCKS BY WEIGHT FOR EACH AXLE CLASS

FIGURE 5



1971 DISTRIBUTION OF REGULAR COMMERCIAL TRUCKS BY WEIGHT FOR EACH AXLE CLASS

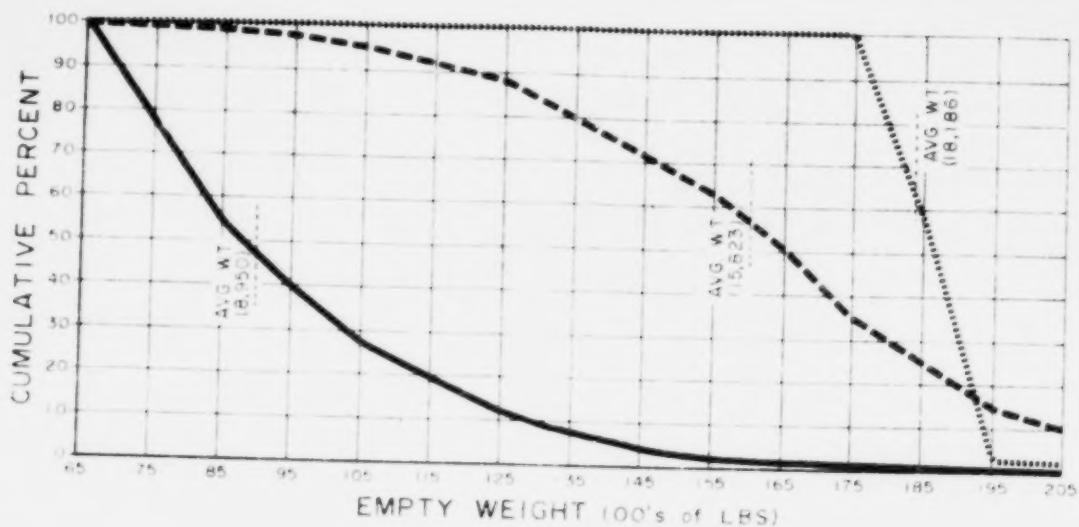
FIGURE 6

The trends were analyzed for the truck axle classes by comparing the distributions and averages in Figures 7 and 8 with those in Figures 5 and 6, respectively. These comparisons show that 2-axle trucks of both truck groups have increased about 10 percent. A slightly greater relative increase is seen for B. E. 2-axle trucks since 1959.

The difference in weight distributions between the 3- and 4-axle trucks was more distinct in 1959. In both groups, 4-axle trucks had a significantly higher average weight. The large growth in that axle class identified earlier in this chapter caused a downward trend from a greater variety of vehicle types. The same tendency is seen for both B. E. and regular commercial trucks.

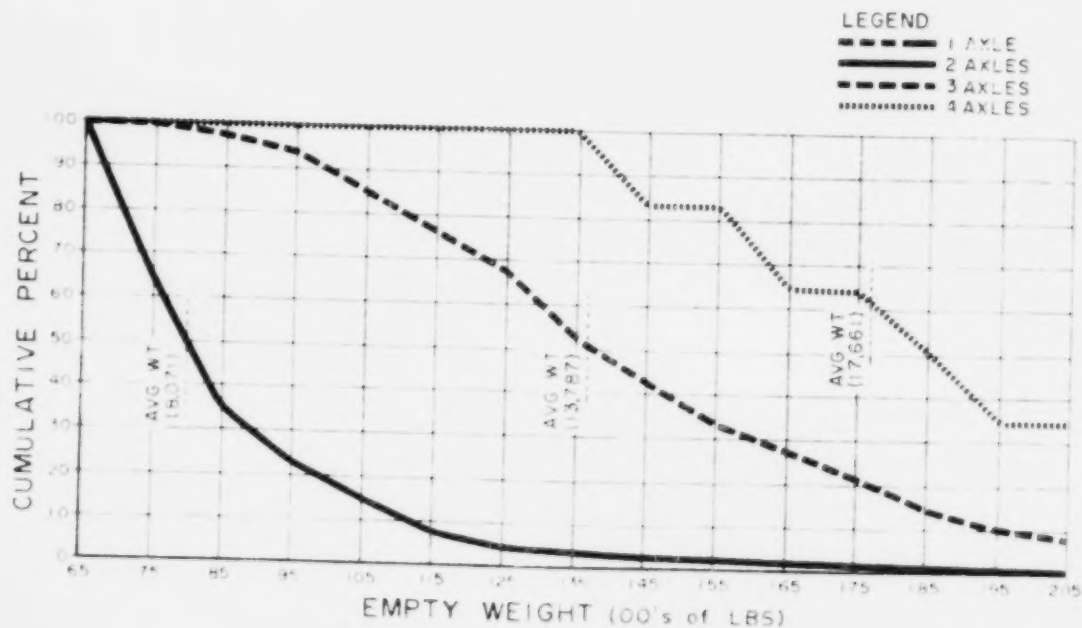
Three-axle truck weight of both truck groups maintained almost stable over the period. Only a marginal decrease in average weight occurred for B. E. trucks while a small increase occurred for regular commercial trucks in this axle class.

In so far as the weight differences between the truck groups are concerned, these are minor and can be attributed to the different vehicle type compositions of the respective groups. Interestingly, the different compositions of vehicle type do not produce significant differences in the weight distributions by axle class.



1959 DISTRIBUTION OF B. E. TRUCKS BY WEIGHT FOR EACH AXLE CLASS

FIGURE 7



1959 DISTRIBUTION OF REGULAR COMMERCIAL TRUCKS BY WEIGHT FOR EACH AXLE CLASS

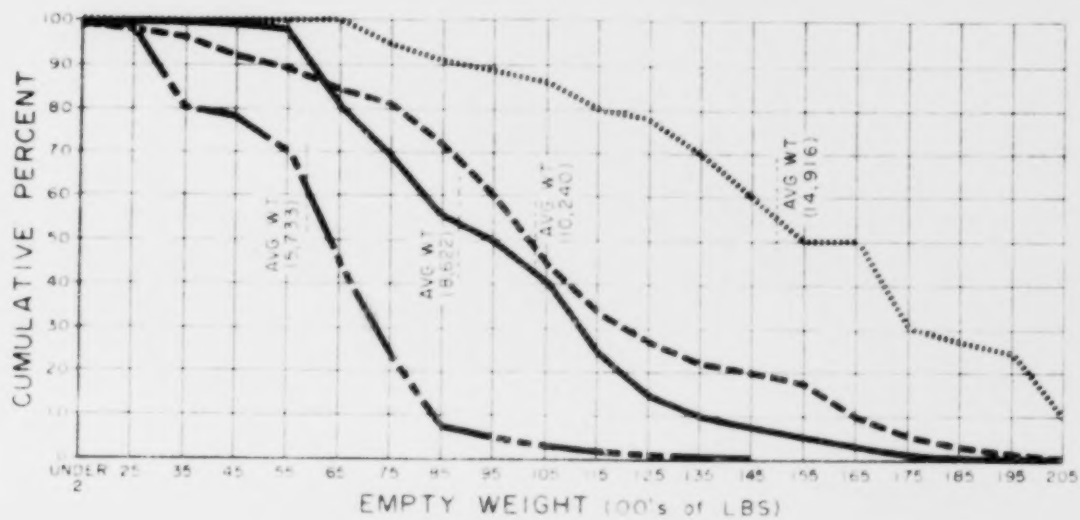
FIGURE 8

Relationship of Weight to Axle Classes of Trailers

The same analysis of truck weight and axle class as carried out for trucks was conducted for trailers in the B. E. and regular commercial groups. Less consistent results, though, were obtained for the weight characteristics by axle class between the groups. It was determined that the divergent compositions of trailers by vehicle type identified earlier for the two trailer groups led to significant differences in the weight distributions by axle class. The nature of the differences are developed in the following review of the analysis.

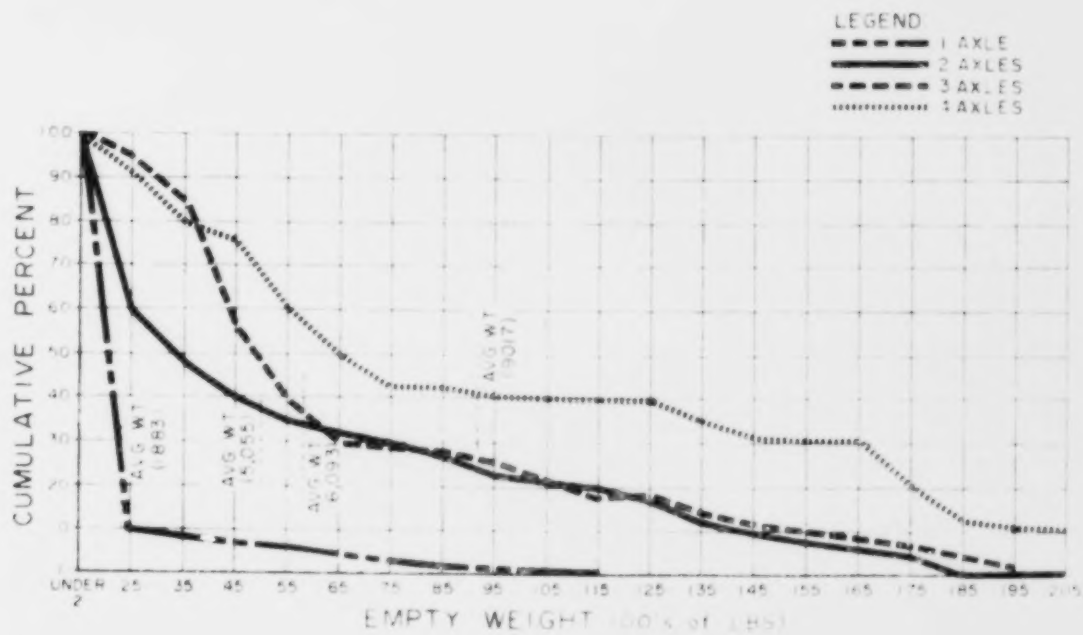
Figures 9 and 10 show the present weight distributions by axle class for B. E. and regular commercial trailers, respectively. Examining 1-axle trailers first, there is a significantly different weight relationship for B. E. trailers as compared with regular commercial trailers. Almost all (90 percent) of the 1-axle regular commercial trailers are under 2,000 lbs. while an even greater percentage of the B. E. trailers in this class are over 2,000 lbs. These distributions result in overall averages for the 1-axle trailers of 5,733 lbs. for the B. E. group and 1,883 lbs. for the regular commercial group.

Similarly large differences can be seen between the weight distributions for the B. E. and regular commercial groups for 2-, 3 and 4-axle trailers. It can be concluded, therefore,



1971 DISTRIBUTION OF B. E. TRAILERS BY WEIGHT FOR EACH AXLE CLASS

FIGURE 9



1971 DISTRIBUTION OF REGULAR COMMERCIAL TRAILERS BY WEIGHT FOR EACH AXLE CLASS

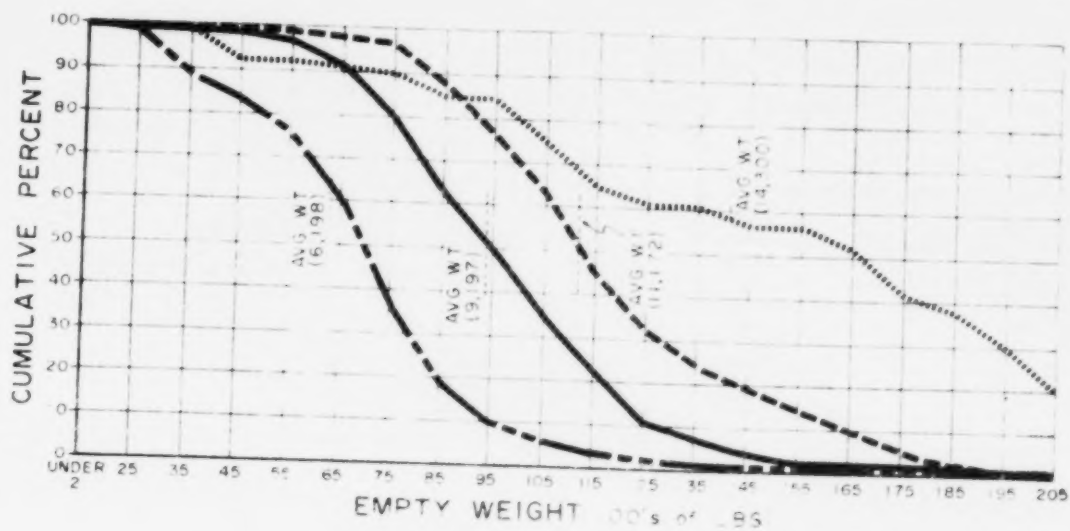
FIGURE 10

that the different vehicle type compositions of the two groups lead to the differences in weight by axle class and that generalizations by axle class can not be made on the basis of weight for all trailers.

The analysis must, therefore, focus on each trailer group separately in order to identify significant relationships by weight and axle class. The result of the analysis showed that the weight distributions of the 1- and 4-axle classes of the B. E. group are fairly distinct with averages of 5,733 lbs. and 14,916 lbs., respectively. On the other hand, the 2- and 3-axle trailers in the B. E. group are somewhat similarly distributed by weight with averages of 8,622 lbs. and 10,240 lbs., respectively.

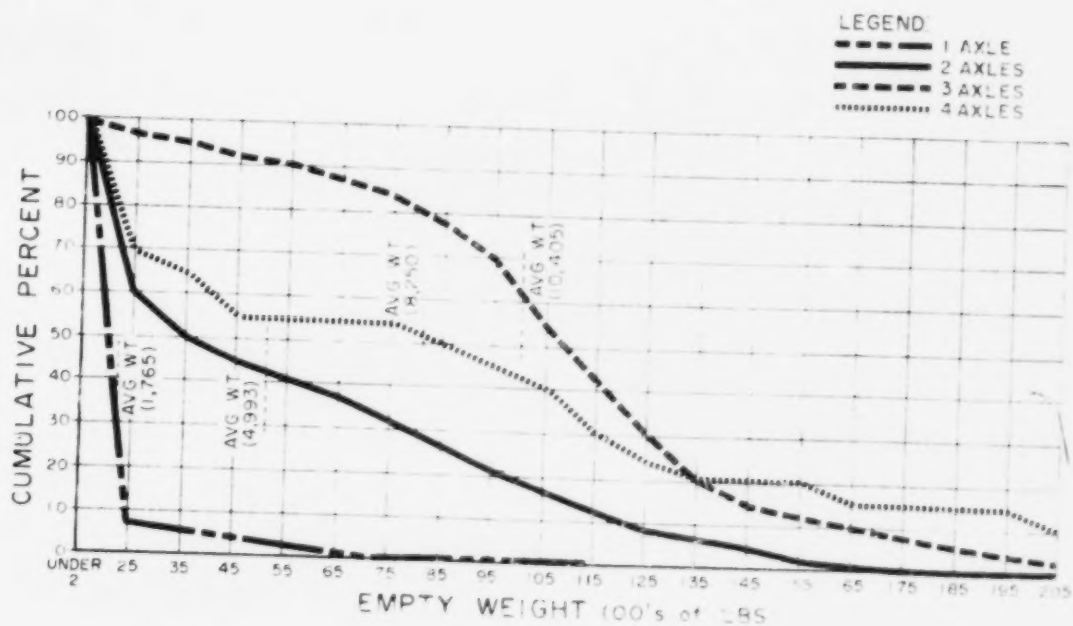
An analysis of the weight distributions of regular commercial trailers in Figure 10 results in the same relative relationships found for B. E. trailers between axle classes, that is, 1- and 4-axle trailers have distinct relationships by weight while there is a strong similarity in the distributions for 2- and 3-axle trailers. Although the same relative relationships exist between regular commercial and B. E. trailers, the absolute differences are large as is evident by comparing the average weights by axle class in Figures 9 and 10.

The trends for the two trailer groups since 1959 are seen by comparing Figures 9 and 10 with Figures 11 and 12



1959 DISTRIBUTION OF B. E. TRAILERS BY WEIGHT FOR EACH AXLE CLASS

FIGURE 11



1959 DISTRIBUTION OF REGULAR COMMERCIAL TRAILERS BY WEIGHT FOR EACH AXLE CLASS

FIGURE 12

respectively. The general observation is that the relationships identified between 1-axle, 4-axle and 2- and 3-axle trailers have not significantly changed over that time period.

Chapter 3

CHARACTERISTICS OF TRUCK USAGE LOS ANGELES BASIN

The previous chapter in this report provides a comprehensive review of the number and type of trucks in the Los Angeles Basin. The truck population was identified for 1959 and 1971 and the trend in the growth of the truck population was identified as well as the changes in its composition. These trend statistics on the population of trucks are important for this study since the only comprehensive survey of actual truck use occurred in 1960. The strategy in this study, therefore, is to establish the basic characteristics of truck use from the 1960 survey, compare them with the 1959 truck population, update the use-patterns and apply the significant use-relationships to the present population of trucks. This approach will result in the development of truck-use patterns representative of current truck activity.

This section in the report reviews the results of the 1960 LARTS Truck Origin-Destination Study. The data has been used

to establish the basic characteristics of truck usage and to indicate their relationship to the total population of trucks. Specifically, the major points emphasized in the analysis are the following:

1. The identification of significant truck classifications and the factors which describe their usage.
2. The proportion of the truck population actually in use at a typical point in time.
3. The travel characteristics of significant truck classes as described by their daily trip-making activity.

These determinations are possible from the 1960 survey along with certain qualifications to be brought out in the following analysis.

The 1960 LARTS Truck Survey

This survey, conducted by the California Division of Highways, was based on a sample of 1959 truck registrations in

the five-county Los Angeles Basin. There were actually two surveys conducted -- one for a sample of Board of Estimate (B.E.) trucks and one for regular commercial trucks. The information obtained in the surveys was identical and focused on the basic size and weight characteristics of trucks in addition to their trip-making activity during a typical day. The typical categories of information obtained in the surveys were the following:

1. Number of total axles
2. Empty weight of truck
3. Total daily mileage
4. Number of daily trips
5. For each truck trip:
 - a. origin and destination
 - b. land use at origin and destination
 - c. travel time
 - d. time of arrival at destination
 - e. type of commodity delivered (if any)
 - f. weight of commodity delivered.

The major drawback of the two truck surveys is the fact that the trucks are classified by total number of axles and it is not possible to differentiate the type of truck (e.g. dump, tractor, etc.) nor the type of trailer (if any). This factor constitutes a large constraint in attempting to relate the survey results to the actual truck population (which is available only on the basis of truck components). As discussed in Chapter 2, some of the results from roadside truck counting studies do give some information which can be used in relating components to number of axles in combination.

It should be mentioned that the 1960 Truck Survey was analyzed by Lester Hoel in 1962 in his thesis, "A Study of the Utilization of Trucks for Transport in Urban Areas." This analysis focused on many of the truck-use relationships important to the current study, but did not have the benefit of coded origin-destination data completed later. The study has provided valuable insights into the nature of truck activity that have expedited the identification of significant truck-use patterns. It was necessary, though, to completely re-analyze the original survey data since the Hoel thesis did not separate out trucks

under 6,000 lbs, nor did the analysis stratify truck use by empty weight.

Sample Size - The Hoel thesis did contain a general appraisal of the quality of the two surveys. The B.E. truck survey was a 10 per cent sample and the regular commercial survey was a five percent sample. The response rate for the regular commercial survey, which was a mail-back questionnaire, expected, but the number of responses was still large enough to provide a significant sample of trucks over 6,000 lbs. The B.E. truck survey obtained nearly a 100 per cent response through the utilization of the direct interview survey procedure. In each case, the survey sample was sufficiently representative of the truck population for the purposes of this study.

Source Data - For this analysis the original survey forms were obtained and the survey results for trucks over 6,000 lbs were transformed onto computer tape for processing. The number of B.E. and regular commercial trucks for which complete information was obtained is indicated in Table 10 along with the breakdown by axle class. The 567 B.E. trucks and 591 regular commercial trucks represent 7,215 and 5,159 truck trips, respectively.

Table 10

NUMBER OF SURVEYED TRUCKS OVER 6,000 LBS.
MAKING TRIPS ON A TYPICAL DAY

<u>NUMBER OF AXLES</u>	<u>B.E. COMMERCIAL</u>		<u>REGULAR COMMERCIAL</u>	
	<u>Number</u> Making Trips	<u>Per Cent (a)</u> Making Trips	<u>Number</u> Making Trips	<u>Per Cent</u> Making Trips
2-axle	262	60	439	86
3-axle	153	71	77	93
4-or more axles	152	75	75	91
	—	—	—	—
TOTAL	567	67	591	87

(a) Percentages derived from L. Hoel thesis.

SOURCE: LARTS 1960 Truck Survey.

Also shown in Table 10 are the proportions of trucks in each class which actually made trips on a typical day. There is a clear inference that the larger the truck of either major type, the higher the level of usage on a day-to-day basis. Overall, regular commercial trucks are utilized 20 per cent more than B.E. trucks on a day-to-day basis. These factors are reasonable estimates of the proportion of the respective truck population that are in use at a typical point in time. Hence, this is an important relationship to be used in interpreting the net number of trucks presently in use from the truck population.

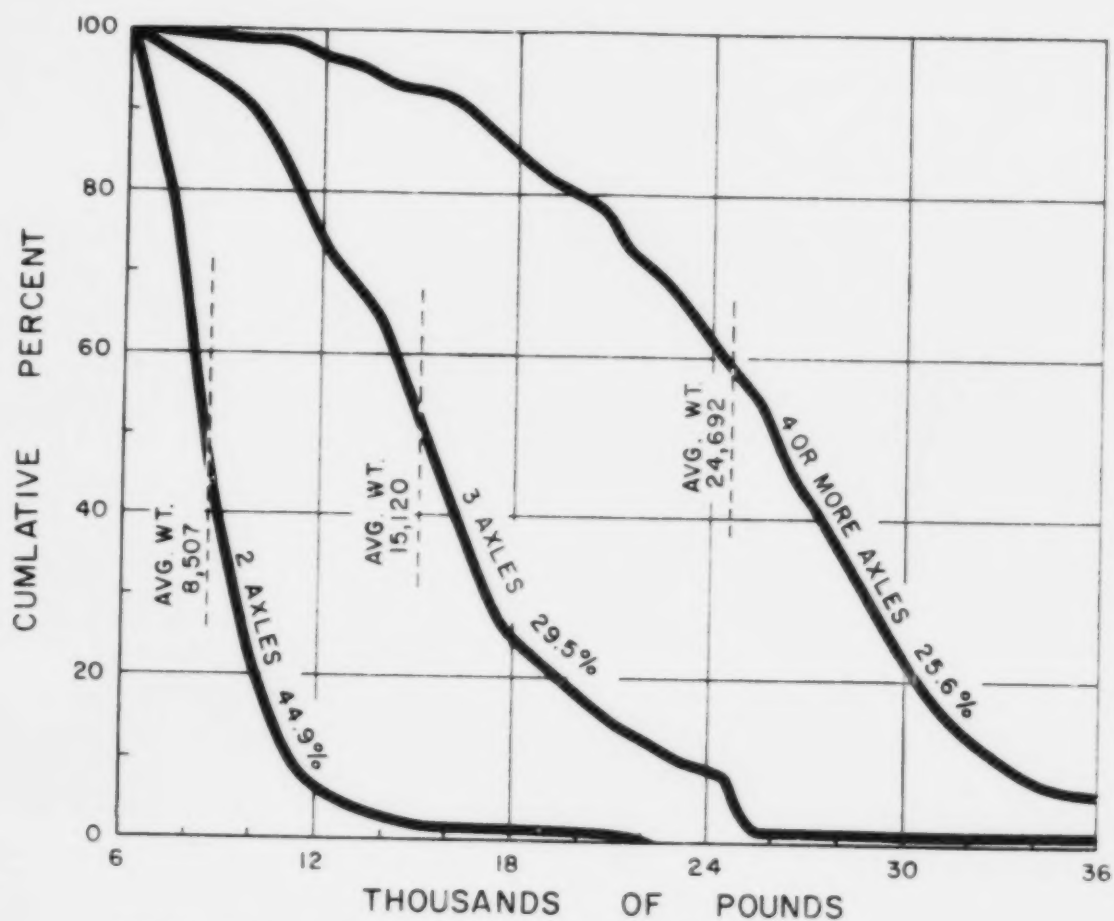
Cross-tabulations of the survey results were obtained in order to help identify the basic truck-use characteristics. For the purpose of clarity, the review of the results begins with the general characteristics of trucks and develops the significant relationships in increasingly greater detail. Throughout the analysis the characteristics of B.E. trucks are compared and contrasted with the respective characteristics of regular commercial trucks.

Empty Weight Versus Number of Axles

The empty-weight and

axle characteristics of B.E. and regular commercial trucks are illustrated in Figures 13 and 14 , respectively. The curves show the cumulative distribution of trucks of a certain axle class by empty weight plotted by 1000's increments. Each point on the curve indicates the percentage of trucks greater than a particular empty weight. For instance, exactly 50 per cent of the 2-axle B.E. trucks in Figure 13 are greater than 8,500 lbs. The same curve shows the range in empty weight for the 2-axle trucks to be from 6,000 to 22,500 lbs. The statistical mode, the highest number of trucks in a particular weight increment, is indicated by the steepest segment of the curve. Thus, the greatest number of 2-axle B.E. trucks are between 7,500 and 8,500 lbs., about 27 per cent. A full summary of axle class versus weight is given in appendix Table A-1.

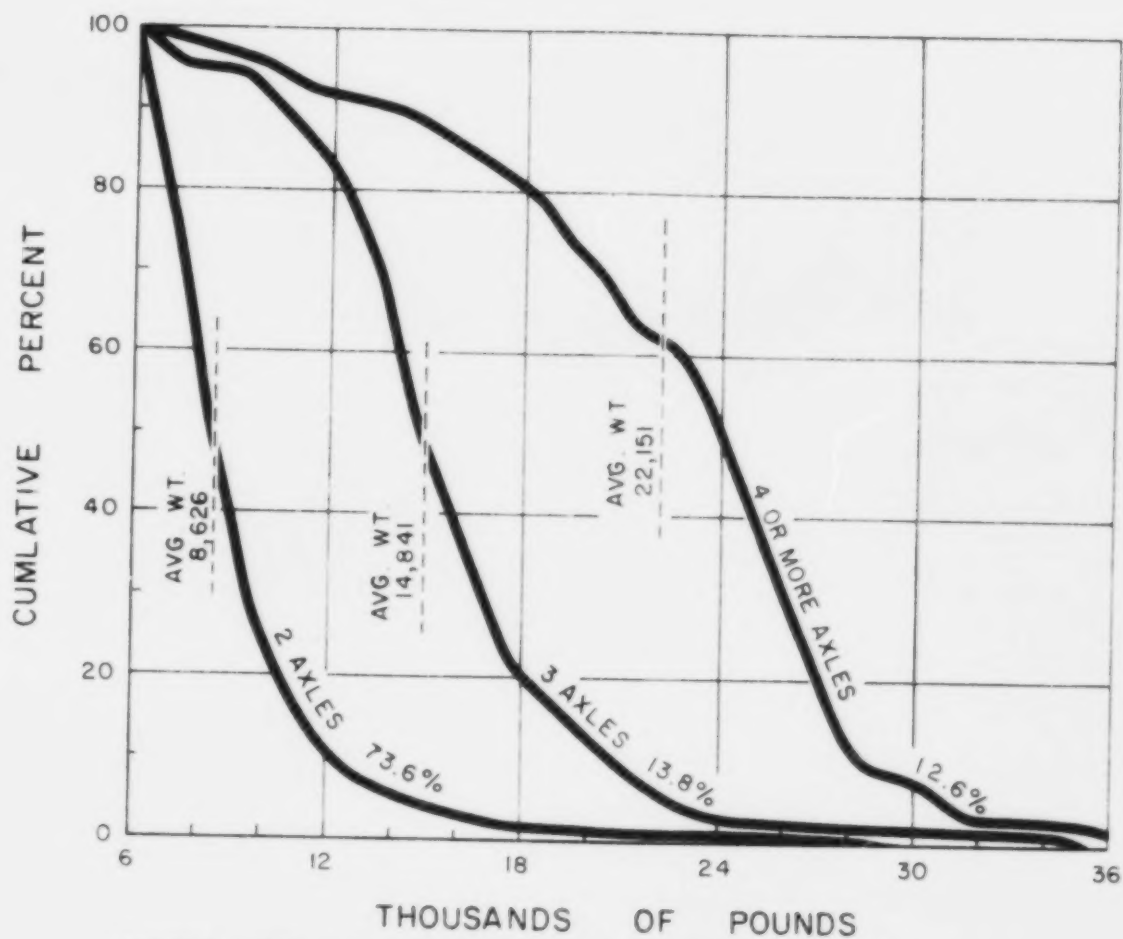
Figures 13 and 14 show the 2- and 3- axle truck distributions by weight to be nearly the same for B.E. and regular commercial trucks. There is a slight difference though for the 4- or more-axle class. The distribution of B.E. trucks has a higher range in empty weight which contributes to its higher average weight of 24,692 lbs. It appears that the 4- or more-axle regular commercial trucks are concentrated between 23,000



SOURCE 1960 LARTS SURVEY OF B.E. COMMERCIAL TRUCKS.

CUMULATIVE DISTRIBUTION OF B. E. TRUCKS BY EMPTY
WEIGHT FOR EACH AXLE CLASS

FIGURE 13



SOURCE: 1960 LARTS SURVEY OF REGULAR COMMERCIAL TRUCKS.

CUMULATIVE DISTRIBUTION OF REGULAR COMMERCIAL TRUCKS BY EMPTY WEIGHT FOR EACH AXLE CLASS

FIGURE 14

and 27,000 lbs as compared to the more evenly distributed B.E. truck fleet includes a greater proportion of trucks with more than 4 axles which would explain the difference in the respective average weights and weight distributions.

Also indicated in Figures 13 and 14 are the percentage of total trucks each axle class. The distribution of B.E. trucks for the 2-, 3-, and 4- or-more axle classes is 44.9, 29.5 and 25.6 per cent respectively. Contrastingly, the distribution of regular commercial trucks is 73.6, 13.8 and 12.6 per cent for the three axle classes. Nearly three-fourths of the regular commercial trucks are 2-axle while this axle class comprises less than half of the B.E. trucks. These relationships indicate significant differences between the compositions of the two truck fleets. With 55 per cent of its trucks having three axles or more, the B.E. truck fleet is considerably heavier in equipment size.

In summary then, it can be seen that for a given axle class, the weight distributions of B.E. and regular commercial trucks are very similar. The composition of the two fleets with regard to axle classes though is significantly different.

Number of Trips per Day

The average trip rate for B. E. trucks is 12.7 trips per day and the average for regular commercial is 8.7 as shown in Figure 15. This is a significant difference indicating an overall higher use of B. E. trucks when in operation. However, as was shown in Table 10 , B. E. trucks have a slightly lower usage on a day-to-day basis.

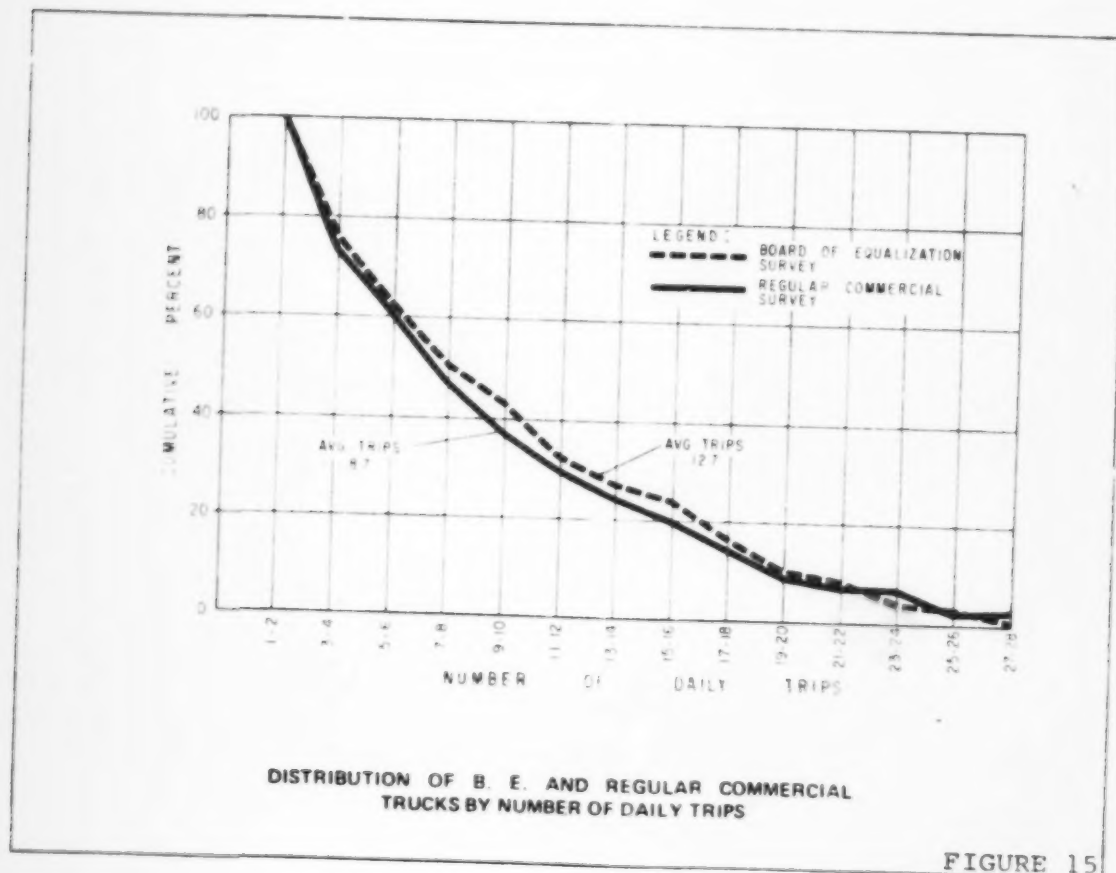


FIGURE 15

The ranges between the two groups with respect to the number of daily trips are seen in Figure 15 to be quite similar. The distributions of trucks throughout the range are also similar with a majority of trucks of each group making 8 or less trips per day.

Figures 16 and 17 show the distributions of each truck group by number of daily trips for each axle class. The average

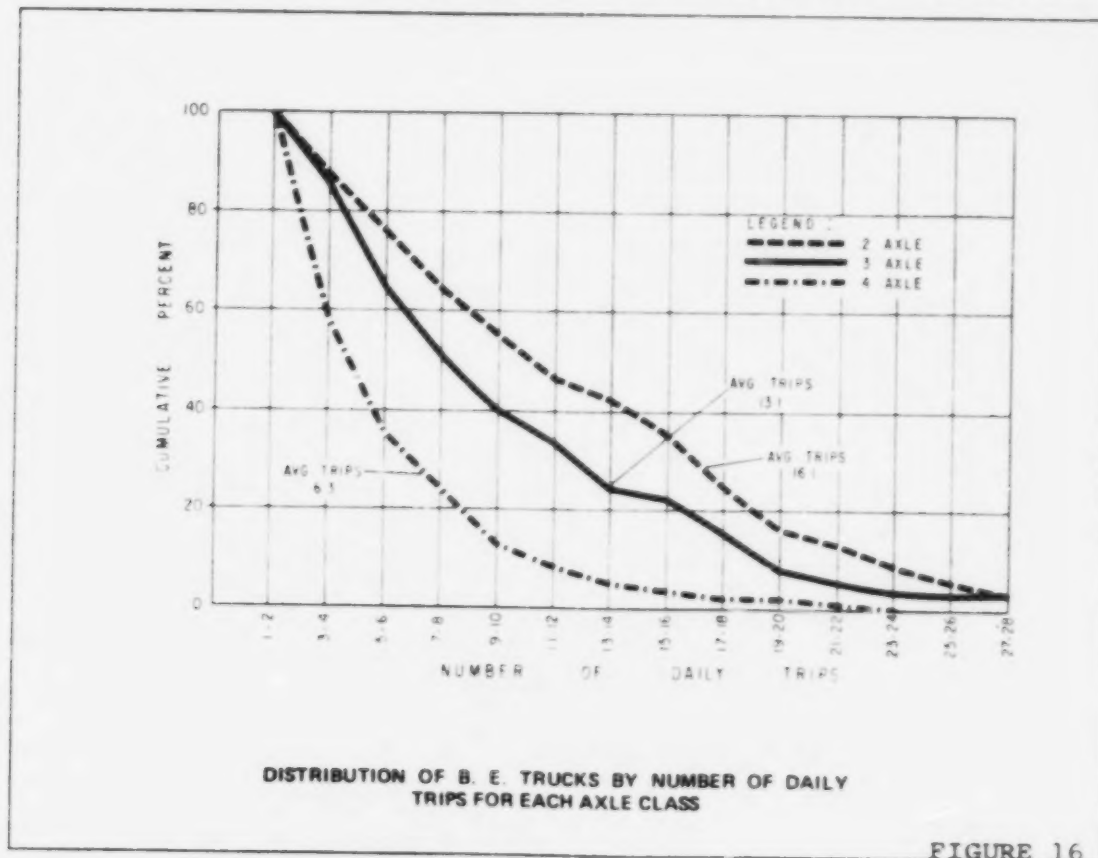


FIGURE 16

number of trips per day range from 6.3 to 16.1 for B.E. trucks and 6.3 to 9.3 for regular commercial. In both cases, the level of daily trips is inversely proportional to the number of axles. Thus, larger trucks make less trips than do smaller trucks. A slight exception to this relationship is seen in Figure 17 for 2-axle trucks which have an unusually large proportion of trucks making one and two trips per day.

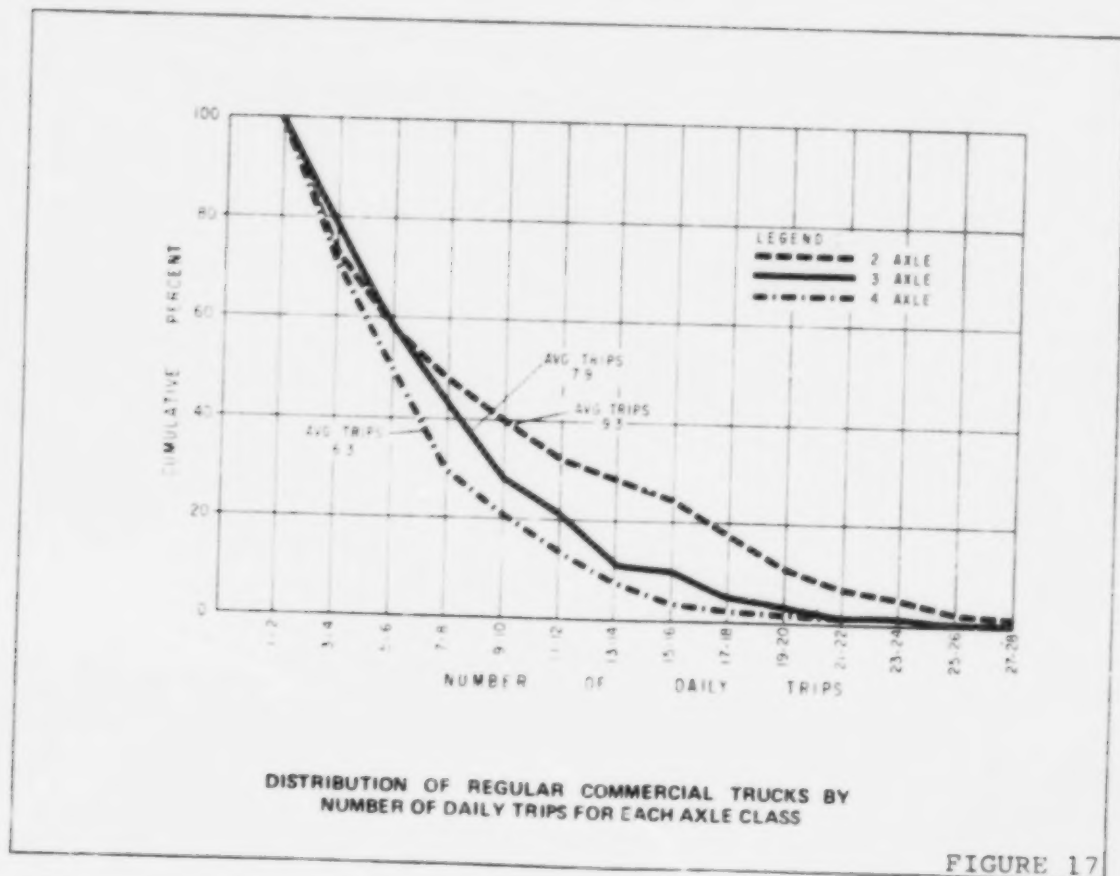


FIGURE 17

A comparison between the two groups for each axle class in Figures 16 and 17 shows the heavy 4 or more axle truck distributions to be very similar. Both the B.E. and regular commercial trucks make an average of 6.3 daily trips. Distinct differences are seen, though, between B.E. and regular commercial trucks for 2- and 3- axle classes. Both 2- and 3-axle B.E. trucks make more trips on the average than the same classes of regular commercial trucks. The largest difference is seen between the 2-axle classes where B.E. trucks make 16.1 trips per day on the average and regular commercial make 9.3.

Daily Mileage

The average daily mileage of trucks in actual use is higher for B. E. than for regular commercial trucks. As indicated in Figure 18, the average daily mileage of B. E.

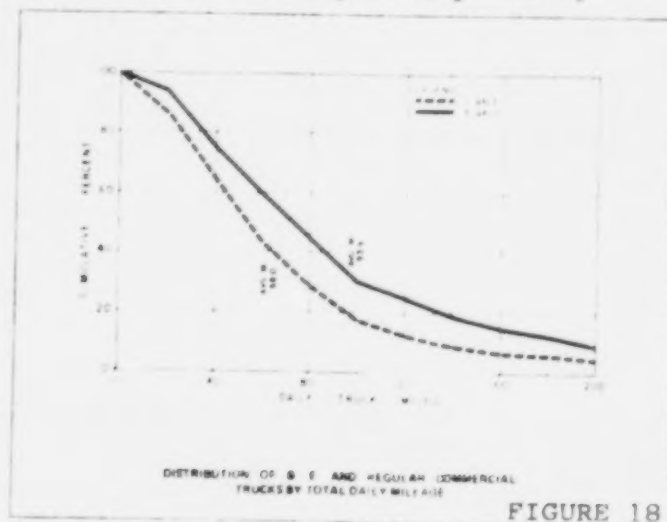
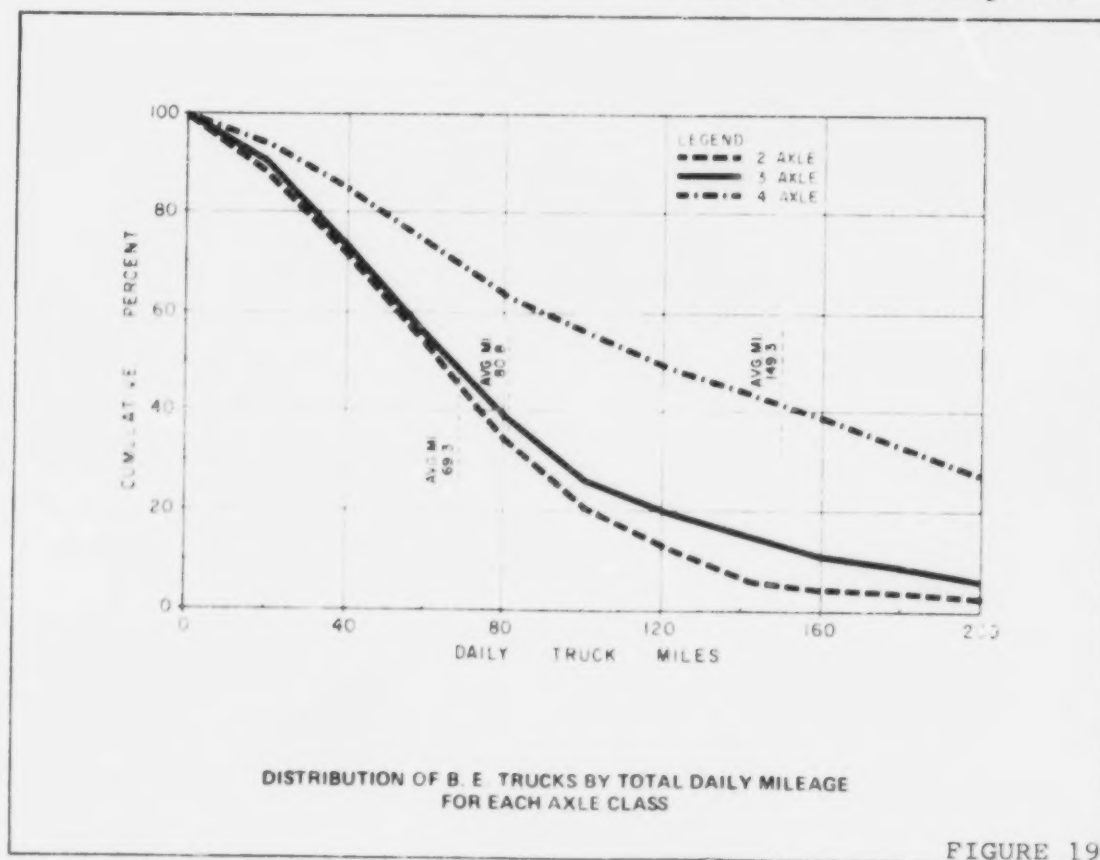


FIGURE 18

trucks is 93.9 miles, over 25 miles more than for regular commercial trucks as shown in Figure 18 are however similar. Break-down of these total daily mileage distributions by axle-class are shown in Figures 19 and 20.

On the axle-class basis, the B.E. trucks have a higher usage in terms of daily mileage than the same axle classes of regular commercial trucks. The differences in the average for



for each axle class reflect higher daily mileage for B.E. trucks by 17, 21, and 25 per cent. For the 2- and 3- and 4 or more axle classes respectively. This indicates an increasing difference in truck use between B.E. and regular commercial trucks in the higher axle class groups. Overall, the total distance a truck travels is correlated with its number of axles, although the ranges indicate a great variety in travel distance for any particular axle class of trucks.

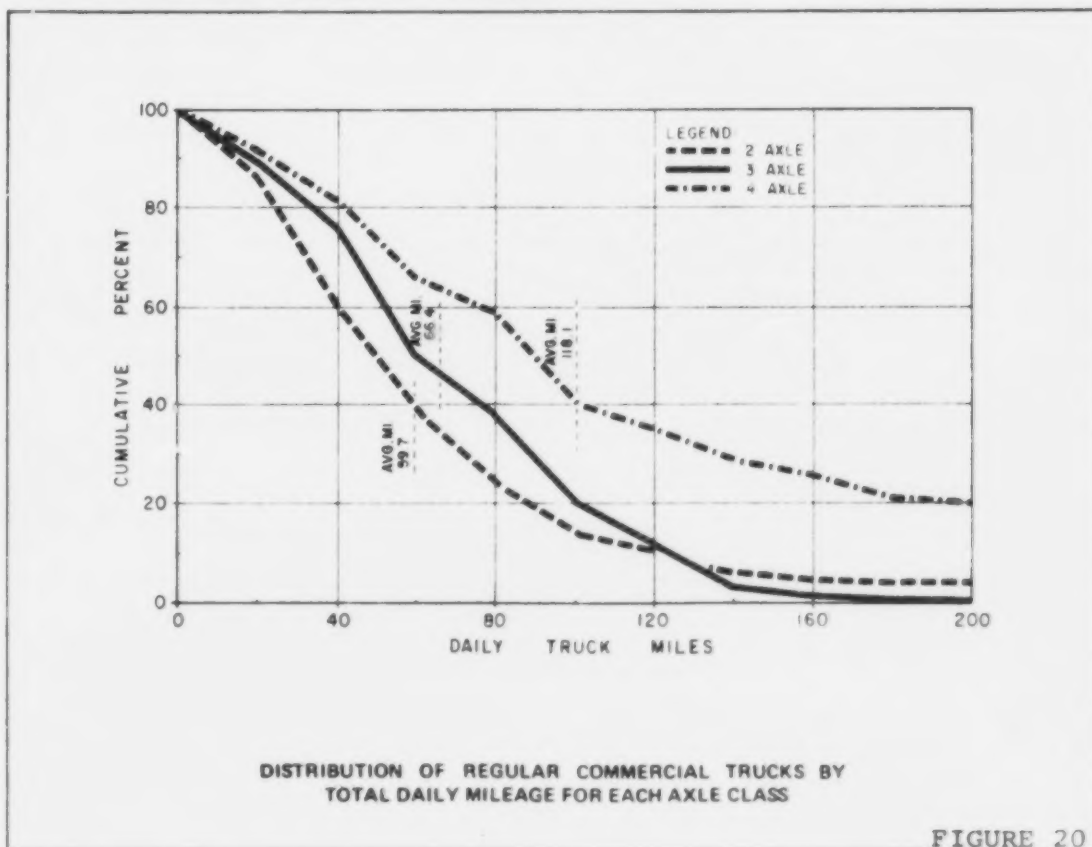


FIGURE 20

It should be noted that the source of the data on daily mileage was the odometer settings of surveyed trucks. This is a good method of obtaining accurate information (as compared to a network type of analysis) and can be relied upon in subsequent analyses in this report which cross-classify the mileage and trip information.

Average Trip Length

Average trip mileage statistics were developed from the daily mileage and trip information described above. The results of the computations yielded the average trip mileage data for the B. E. and regular commercial trucks summarized in Table 11 . It is seen that the overall trip mileage averages are nearly the same for the two truck groups. The breakdowns of average trip mileage by axle class show that regular commercial trucks in the 2- and 3-axle classes have slightly greater average trip mileage than the respective classes of B. E. trucks. Contrastingly, the B. E. trucks in the 4 or more axle class have a significantly higher average trip mileage than the same class of regular commercial trucks.

Table 11
AVERAGE TRIP MILEAGE
FOR B.E. AND REGULAR COMMERCIAL TRUCKS
BY NUMBER OF AXLES (in miles)

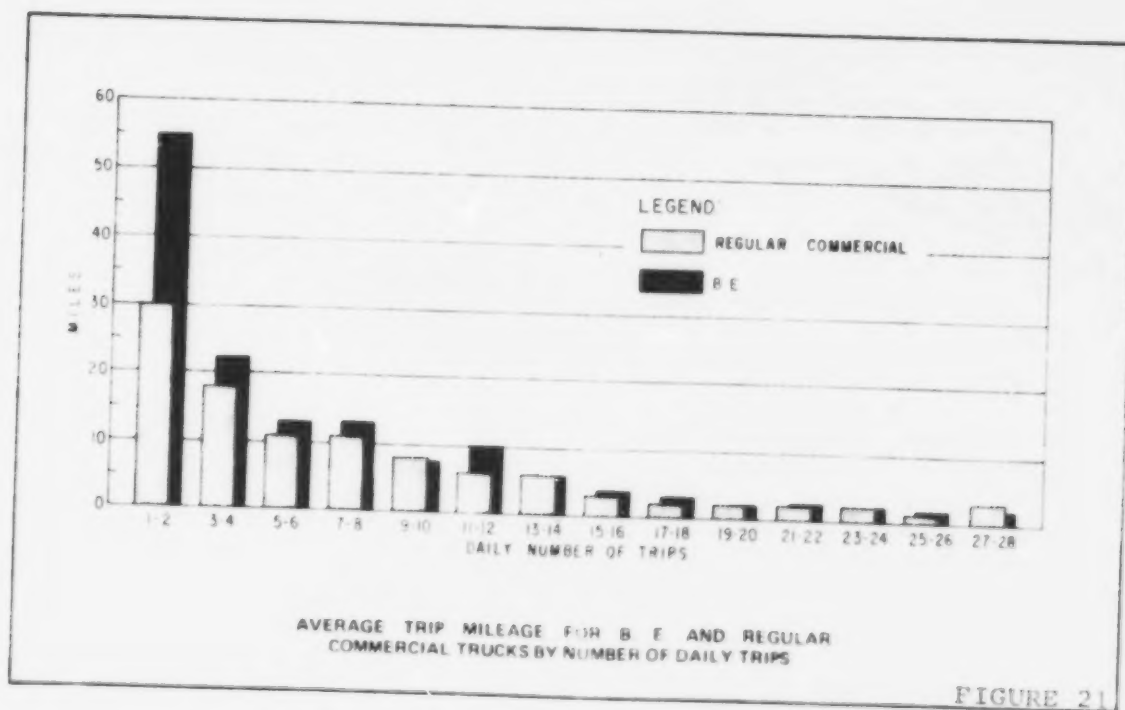
<u>NUMBER OF AXLES</u>	<u>B. E. TRUCKS</u>	<u>REGULAR COMMERCIAL TRUCKS</u>
2-axle	4.3	6.4
3-axle	6.2	8.4
4 or more axles	23.6	18.9
All Axles	7.4	7.8

Source: LARTS 1960 Truck Survey

The results in Table 11 strongly indicate the positive correlation of average trip mileage with the number of truck axles. While there is only a small difference between 2- and 3- axle trucks, the much higher average trip mileages of the 4 or more axle classes indicate a significantly different pattern of truck-use for heavier trucks.

Trip Mileage Versus Trip Rate

Average trip mileage was also analyzed for the range of daily trips made by trucks. Figure 21 compares the average trip mileage for the range of daily trip rates for both B.E. and regular commercial trucks. It is seen that the average mileage per trip is under 10 miles for the trucks of each group making 9 or more daily trips. Under 9 trips per day, the average mileage increases to about 55 miles and 30 miles for the B.E.



and regular commercial trucks, respectively. Higher average trip mileage was found for B.E. over regular commercial trucks for all daily trip rates under 9.

Figures 22 and 23 stratify the average trip mileage by daily trip rate for each axle class. The figures show that average trip mileage is largely a function of truck size regardless of trip rate. This is true for both B.E. and regular commercial trucks, the only exceptions occurring in a few of the higher daily trip rates for both truck groups.

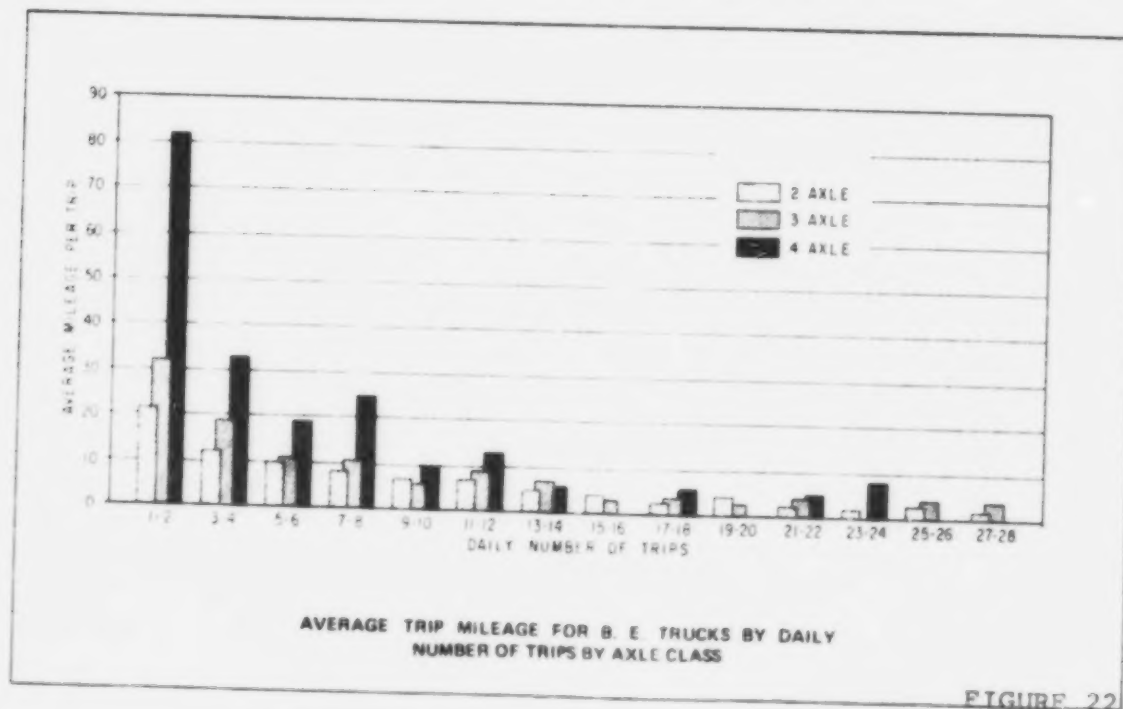


FIGURE 22

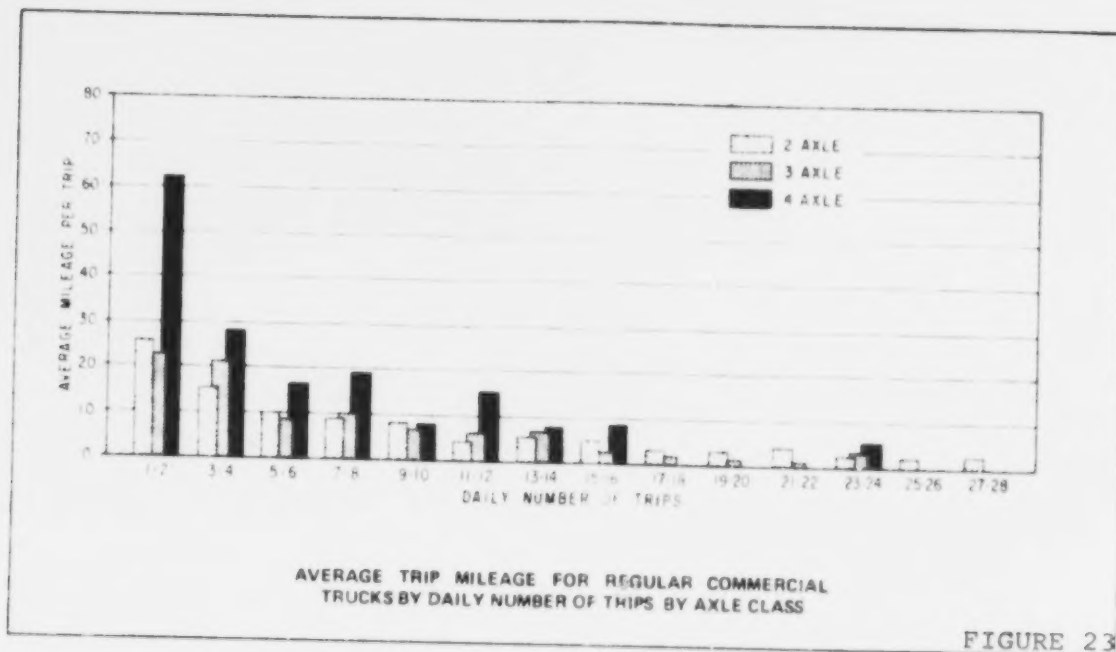


FIGURE 23

On the whole, the 3-axle trucks have a slightly higher average trip mileage than 2-axle trucks for a given number of daily trips. A large difference is seen, though, between the 3-axle and 4 or more axle classes where average trip mileage is often twice as high for 4 or more axle trucks for a given number of daily trips.

It was indicated that the average trip mileage was higher for B.E. trucks than for regular commercial trucks making less than 9 trips per day. This is explained primarily by the larger proportion of all B.E. trucks in the higher axle classes than for regular commercial trucks (See Figures 14 and 15).

Travel Time Distributions

The overall average travel times per trip are very similar for B.E. and regular commercial trucks; 22 and 20.6 minutes, respectively. Figure 24 shows the cumulative percentage of

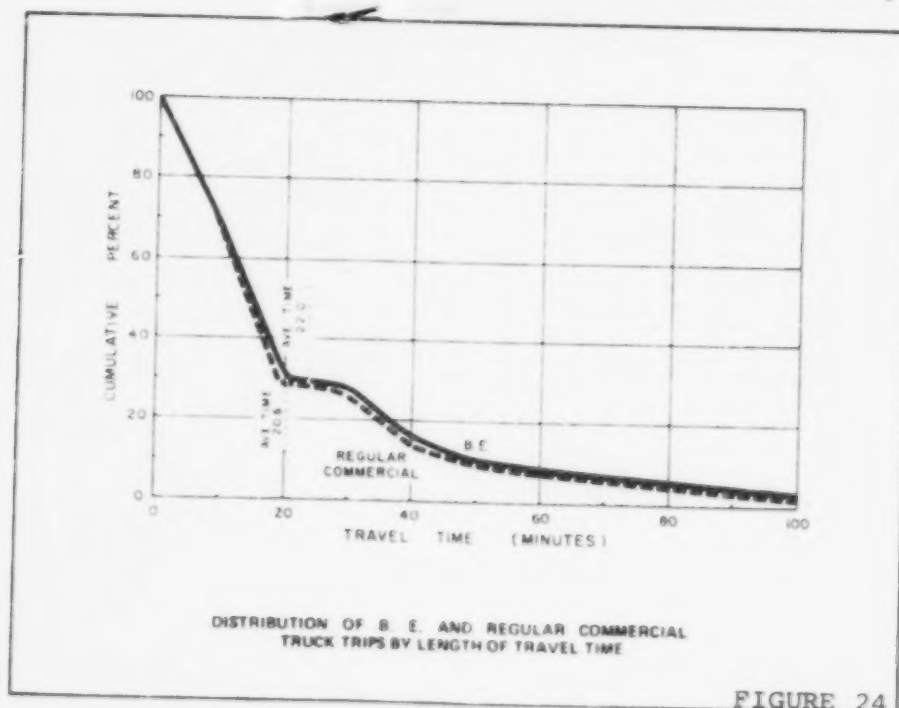
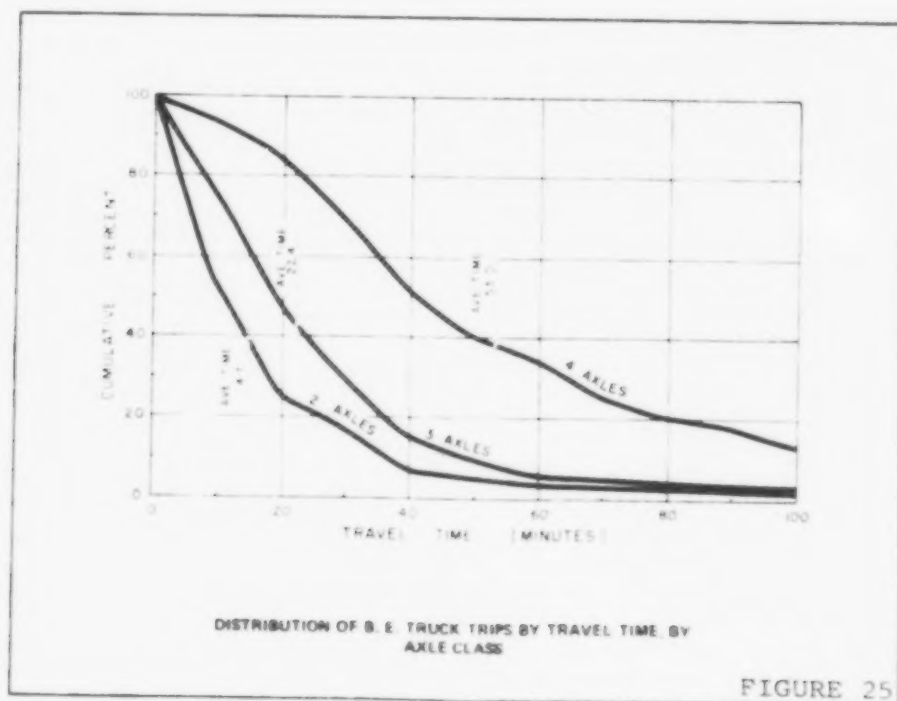
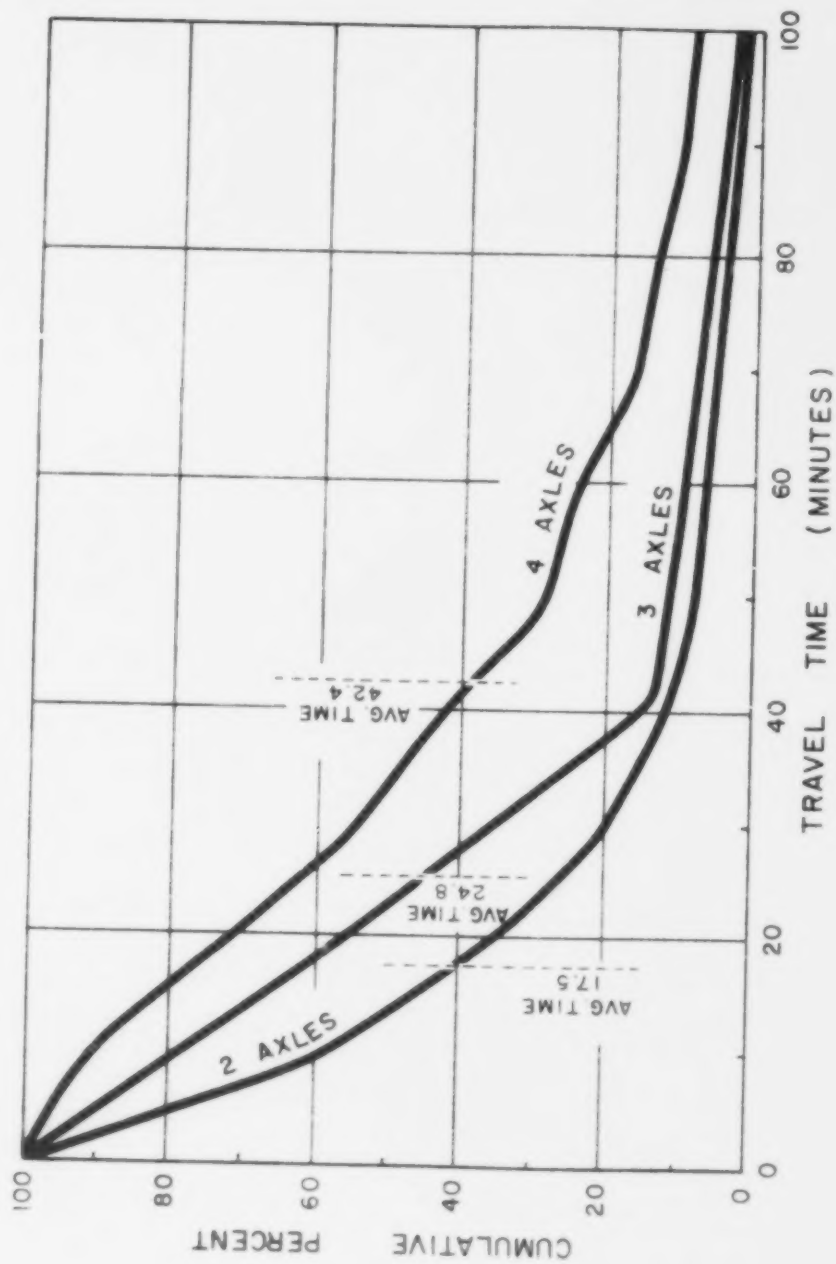


FIGURE 24

truck trips versus the travel time per trip for each truck group.

Trip travel-time increases with truck size along with trip mileage. Figures 25 and 26 show the trip travel-time distributions for the major truck groups by number of axles. Average trip travel-times for 2- and 3- axle trucks are slightly less for B.E. trucks while the average travel time for B.E. 4 or more axle trucks is significantly higher than the average for the same class of regular commercial trucks. These basic relationships correlate with the average trip mileage figures in Table 11 as could be expected.





DISTRIBUTION OF REGULAR COMMERCIAL TRUCK TRIPS BY
TRAVEL TIME, BY AXLE CLASS

The trip travel-times for both the B.E. and regular commercial trucks have a large range by axle class. Only a small percentage, though, of the 2- and 3- axle trucks have times longer than 70 minutes, while 4-axle trucks have a significant proportion of trips over 100 minutes, particularly B.E. trucks.

Average Speed

The average speeds of trucks were obtained by relating average trip travel time to the average trip mileage of trucks in the three axle classes. The results of these computations are shown in Table 12 where it is seen that the overall average speed of regular commercial trucks is slightly greater than for B.E. trucks. The important relationships shown in Table 13 are the higher average travel speeds for 4 or more axle trucks of both truck groups relative to the smaller axle classes and the slightly lower average travel speeds of 3-axle trucks relative to 2-axle trucks. These relationships suggest the following possibilities concerning the spatial pattern of truck travel:

1. Trucks with 4 or more axles operate on higher speed roadways since their travel speeds are high as well as their travel distances.

Table 12

AVERAGE TRAVEL SPEEDS FOR B.E.
AND REGULAR COMMERCIAL TRUCKS

<u>NUMBER OF AXLES</u>	<u>B. E. TRUCKS</u>	<u>REGULAR COMMERCIAL TRUCKS</u>
2-axle	17.6 mph	21.9 mph
3-axle	16.6 mph	20.3 mph
4 or more axles	26.7 mph	26.7 mph
All axles	20.2 mph	22.7 mph

SOURCE: LARTS 1960 Truck Study

Table 13

AVERAGE DAILY HOURS OF TRUCK OPERATION
FOR B.E. AND REGULAR COMMERCIAL TRUCKS

<u>NUMBER OF AXLES</u>	<u>B.E. TRUCKS</u>	<u>REGULAR COMMERCIAL TRUCKS</u>
2-axle	3.9	2.7
3-axle	4.9	3.3
4-axle	5.6	4.5
All axles	4.7	3.0

SOURCE: LARTS 1960 Truck Survey

2. Three-axle trucks, with their slightly greater travel distances than 2-axle trucks, operate primarily on the same type of lower speed roadways as 2-axle trucks.

The total time of daily truck operation is an important characteristic for the development of representative truck-use patterns. This characteristic has been obtained from the surveys by relating the number of daily truck trips to their travel times. The results of the computations are summarized in Table 13 which shows the average daily hours of truck operation for the two major truck groups. The results significantly show increasing hours of actual use for increasing number of axles.

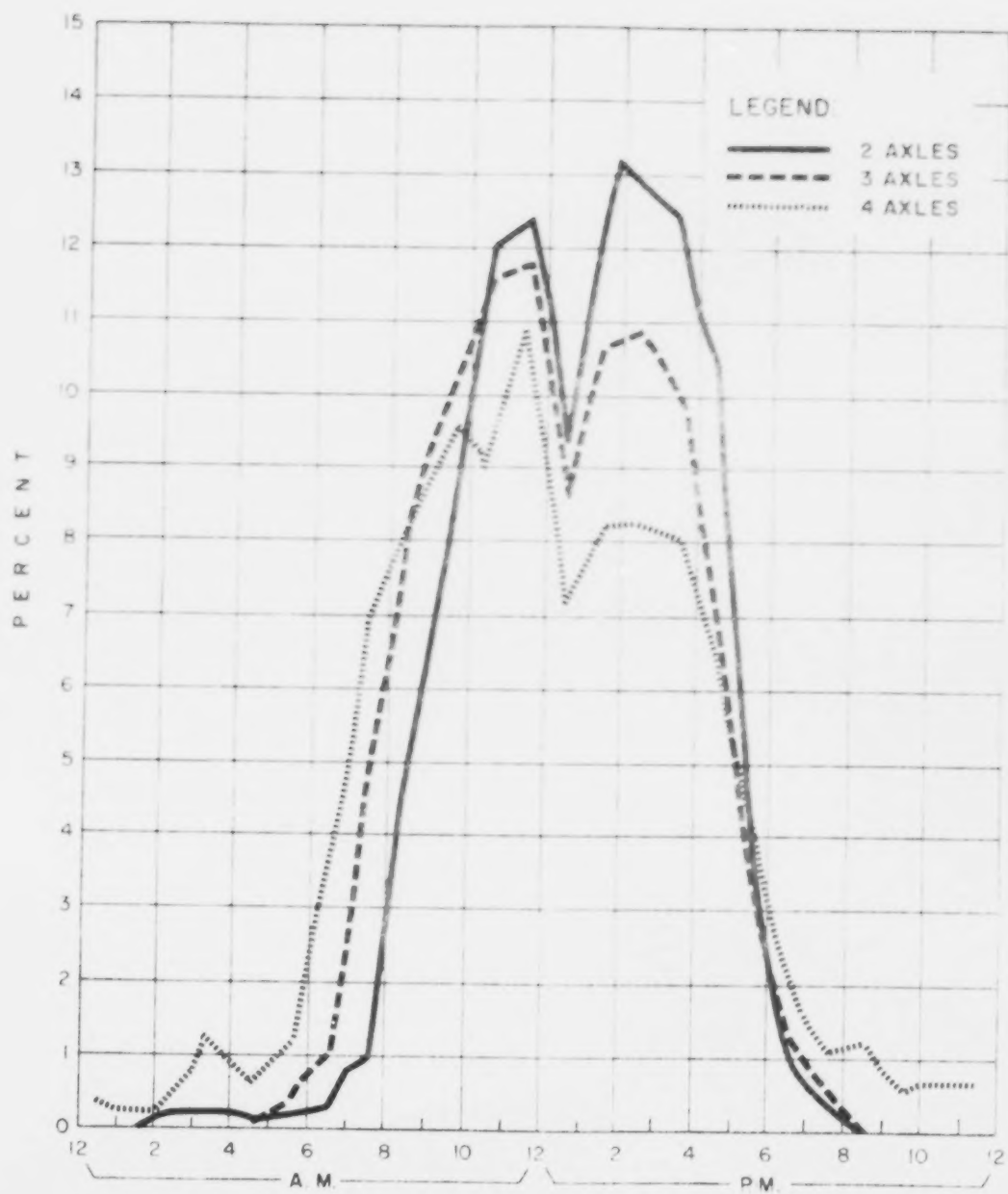
The average time of daily truck operation is greater for B.E. trucks than for regular commercial trucks, 4.7 hours to 3.0 hours, respectively. In the case of each axle class, the B.E. trucks are in operation more than one hour longer on the average than their counterparts in the regular commercial group. Along with the other results of the surveys, these data indicate the relatively higher level of usage of B.E. trucks with respect to regular commercial trucks.

Time Distribution

The distribution of truck operations during the day gives the hours during which the travel activity outlined above actually occurs. The Hoel thesis contained an analysis of trip arrival times for the major truck groups stratified by axle class. These relationships are taken from his thesis as shown in Figures 27 and 28.

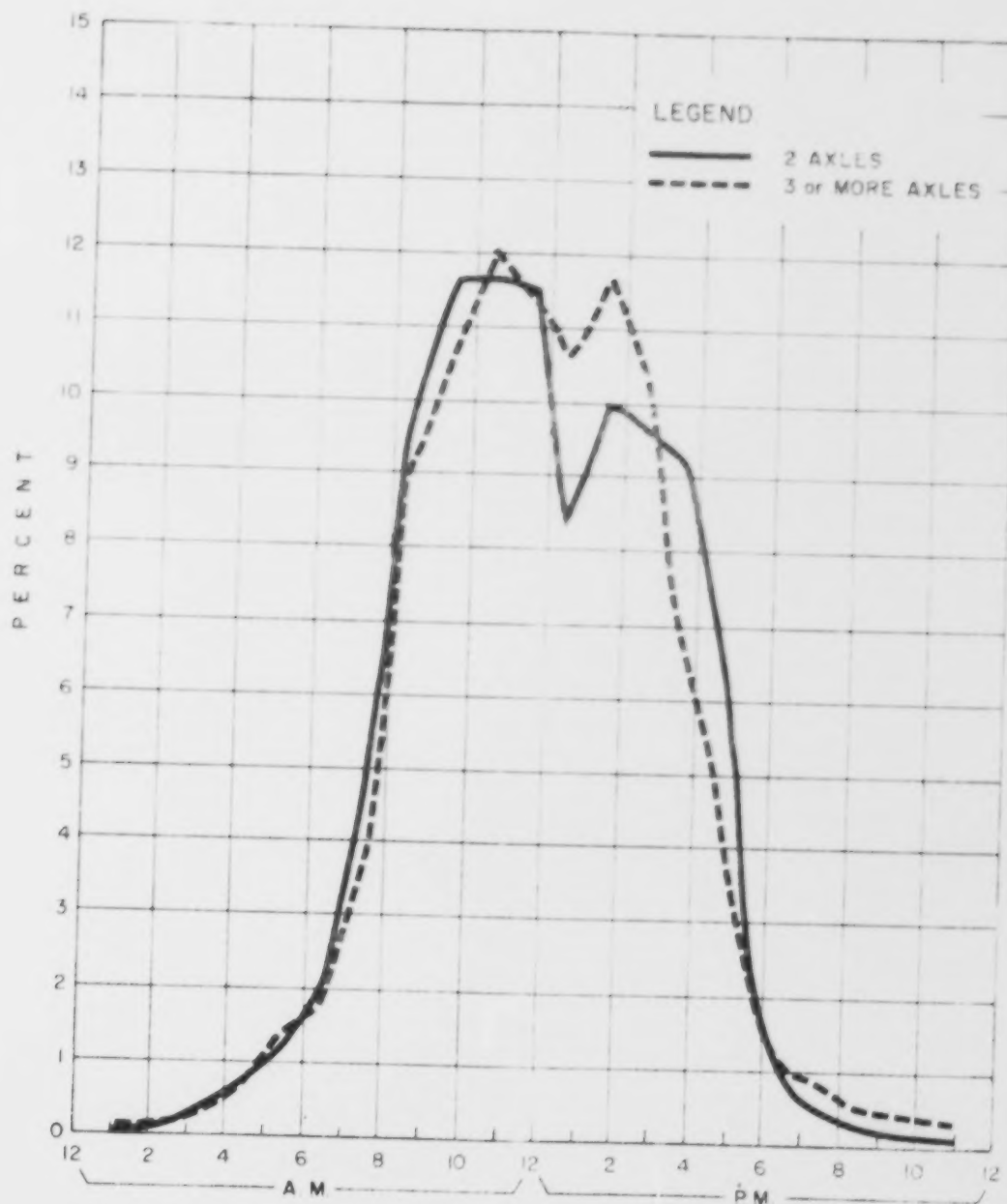
As seen from the Figures, the general rate of truck activity during the day is similar between the major truck groups and their axle classes. Essentially most truck-trip arrivals occur in late morning, drop off slightly during the middle of the day, increase again in the afternoon and quickly reduce in late afternoon. Only 4 or more axle trucks show any significant amount of arrivals during the period from 8 p.m., to 5 a.m.

The distribution of travel activity of B.E. trucks shows an interesting relationship between the proportions of trip arrivals for the three axle classes at any point in time. Specifically, it appears that in the early morning (5 a.m. to 8 a.m.) the level of truck activity is positively correlated with the number of truck axles. Conversely, after 8 a.m., the distributions change so that after 10 a.m. and until 5 p.m., the 2-axle



SOURCE A STUDY OF THE UTILIZATION OF TRUCKS FOR TRANSPORT
IN URBAN AREAS (THESIS), LESTER HOEL, 1962

DISTRIBUTION OF DESTINATION TIMES OF B. E.
COMMERCIAL TRUCKS



SOURCE A STUDY OF THE UTILIZATION OF TRUCKS FOR TRANSPORT
IN URBAN AREAS (THESIS), LESTER HOEL, 1962.

DISTRIBUTION OF DESTINATION TIMES OF REGULAR
COMMERCIAL TRUCKS

trucks have the highest proportion of activity followed in order by 3-axle and 4 or more axle trucks. These relationships indicate the level of interdependence between trip-making activity and the traditional business hours for the three axle classes.

Regular commercial trucks, on the other hand, do not have the clear-cut differences between axle classes. In fact, the distributions of trip activity during the day are fairly similar between axle classes. Additionally, it appears that the level of truck activity between 8 p.m. and 5 a.m. is very low.

Load Carrying Characteristics

The analysis in this section involve only those truck trips in which a commodity was actually delivered. The percentages of these delivery trips of all truck trips were calculated and are summarized in Table 14. It appears that the percentage of commodity-delivery truck trips decreases as the number of axles in a truck increases. This is explained by the fact that a large percentage of the deliveries made by the heavier trucks probably involve the drop-off of a full load, whereas the lighter trucks make many small deliveries consisting of only part of the total load carried. Hence, a higher percentage of heavier truck

Table 14

PERCENTAGE OF TRUCK TRIPS IN WHICH A COMMODITY
WAS ACTUALLY DELIVERED, FOR B. E. AND REGULAR
COMMERCIAL TRUCKS

<u>NUMBER OF AXLES</u>	<u>B. E. TRUCKS</u>	<u>REGULAR COMMERCIAL TRUCKS</u>
2-axle	75	75
3-axle	53	65
4-axle	56	60
All axles	67	72

SOURCE: LARTS 1960 Truck Study.

trips are likely to involve empty truck operations.

The load-carrying characteristics of truck operations were obtained on the basis of the type and weight of commodity carried on each trip. These results are summarized for B.E. and regular commercial trucks in Figure 29. Seventy per cent of all B.E. truck trips, in which a commodity was carried, involved commodity weight less than 5000 lbs. Regular commercial trucks had 87 per cent of the weight carried under 5000 lbs. The results in

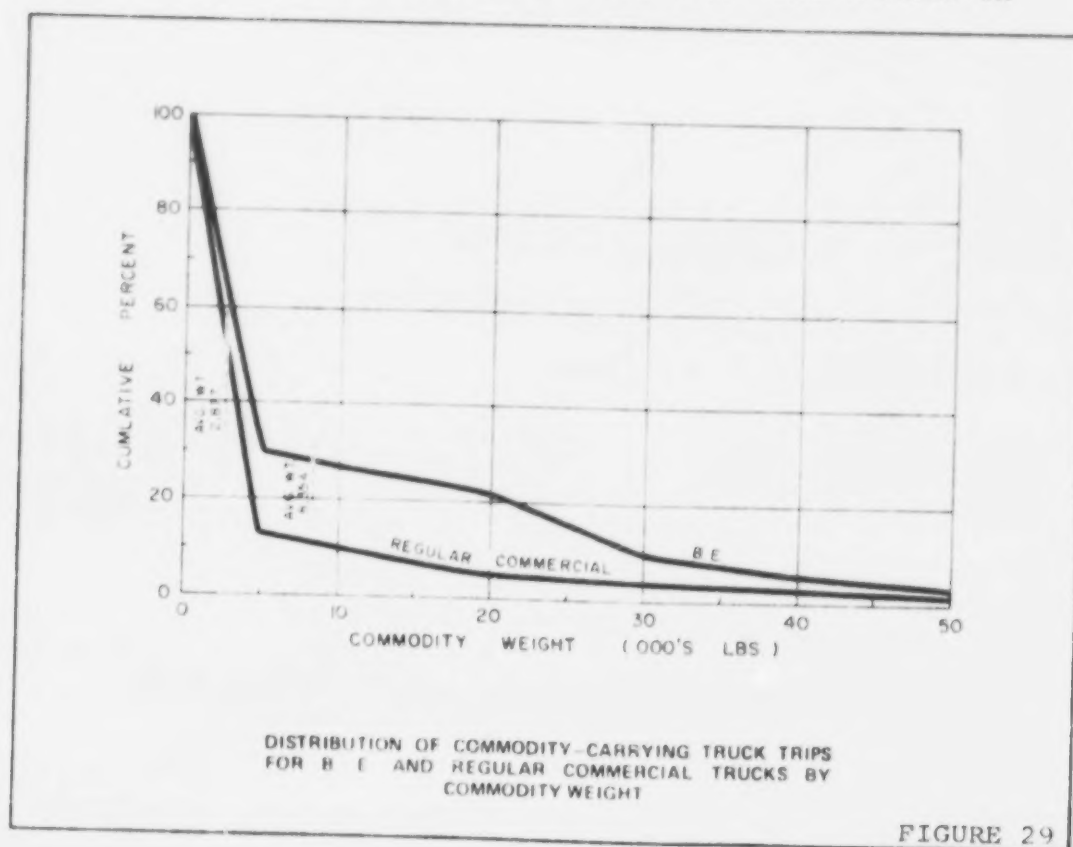
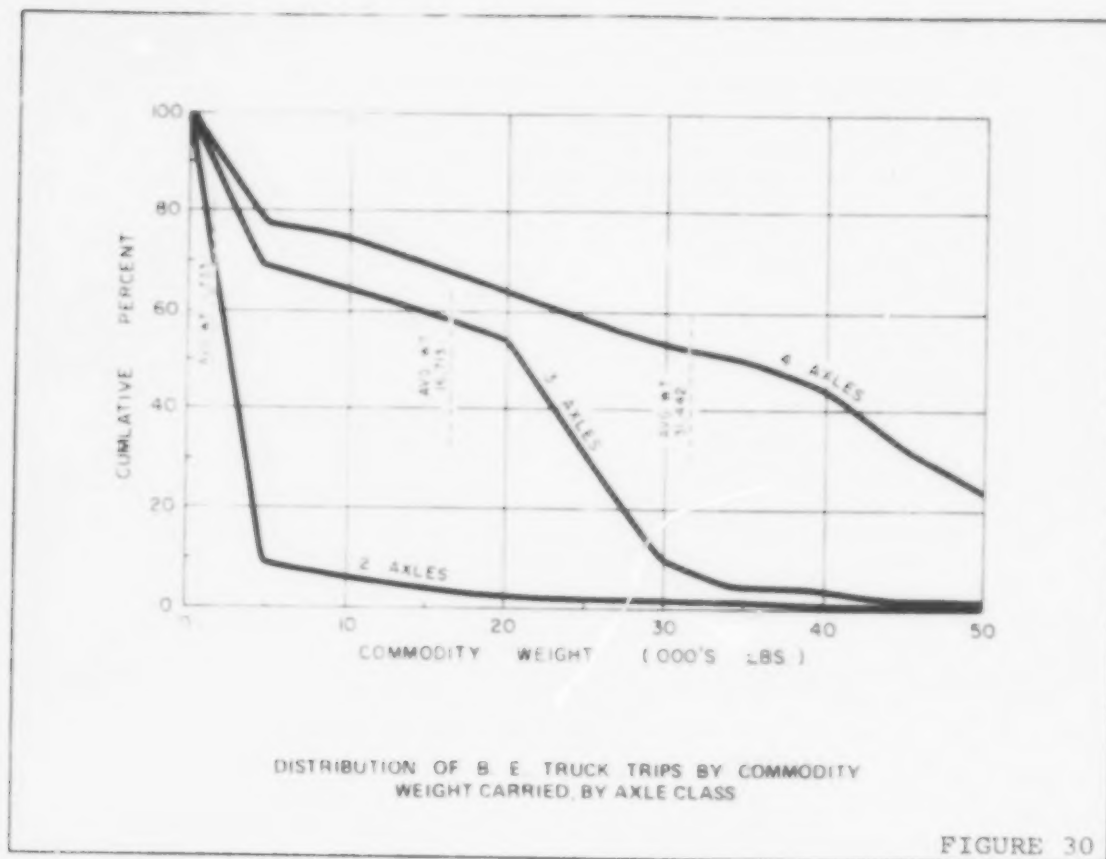


FIGURE 29

Figure 29 indicate that commodity weight ranges to over 60,000 lbs. Another significant difference between B.E. and regular commercial trucks is the relatively large percentage of B.E. truck trips (14 per cent) carrying between 20,000 and 35,000 lbs. (Only 2 per cent for regular commercial trucks). Overall, the average commodity-weights for B.E. and regular commercial trucks are 8,354 and 2,877 lbs. respectively.

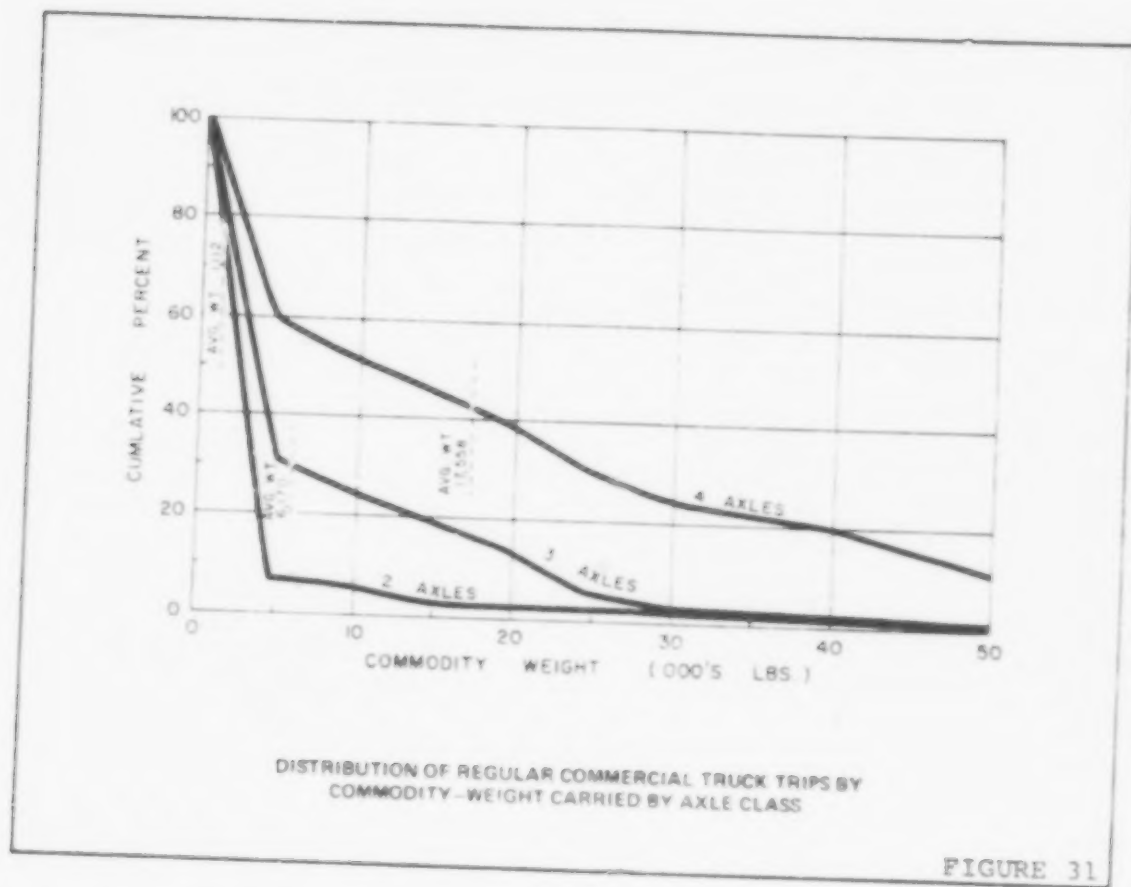
The commodity-weight distribution of trips in Figure 29 only includes those trips in which a delivery was actually made. These trips comprise 67 per cent of all B.E. truck trips and 72 per cent of all regular commercial truck trips.

The commodity-weight characteristics of trips are stratified by axle class for B.E. and regular commercial trucks in Figures 30 and 31. It is seen that the greater the number of axles, the larger the disparity between B.E. and regular commercial trucks. The average weights carried by 2-, 3-, and 4 or more axle classes are 1,733, 16,713 and 31,442 lbs., respectively, for B.E. trucks. The comparable average weights for regular commercial trucks are 1,112, 6,170 and 17,558 lbs, respectively. The greatest difference is found for the 3-axle



class where B.E. trucks delivery more than 2 1/2 times more weight than the same class of regular commercial trucks on the average.

A comparison of the commodity-weight distribution of trips for 2-axle trucks shows a similar distribution between B.E. and regular commercial trucks. The largest difference is seen in the



relatively larger percentage of B.E. truck trips carrying between 15,000 and 25,000 lbs.

For 3-axle trucks there are two characteristics which distinguish B.E. trucks from the same class of regular commercial trucks and contribute to their higher average commodity weight. Comparing Figures 30 and 31, it is seen that only 32 per cent

of the 3-axle B.E. commodity carrying truck trips carry less than 5000 lbs as compared with 70 per cent for 3-axle regular commercial trucks. The other distinguishing characteristic is the fact that 49 per cent of the 3-axle B.E. commodity carrying truck trips carry weights between 20,000 and 35,000 lbs as compared with 11 per cent for regular commercial trucks.

The basic differences between 4 or more axle trucks and regular commercial trucks of that same class lies in the percentage of trips that carry loads less than 5000 lbs and more than 35,000 lbs. Only 22 per cent of the loaded B.E. truck trips carry less than 5000 lbs as compared with 42 per cent for regular commercial trucks. On the other hand, 52 per cent of the B.E. truck trips in this axle class carry over 35,000 lbs as compared with 20 per cent for the same type of regular commercial truck.

Network Analysis

In addition to the information already described, the 1960 truck survey recorded the origin and destination address for each trip and this was subsequently coded according to a grid co-ordinate

system. The capability therefore existed for developing origin-destination tables and examining characteristics such as time and distance frequency distributions.

As a basis for this origin-destination analysis, the 1967 LARTS zone system was used, giving a total of 1,266 zones in the study area. The centroids for these zones had also been coded to a grid co-ordinate system (although not the same as that used for the Truck Study). A conversion between the two co-ordinate systems was established and then truck origins and destinations assigned to the nearest zone. The procedures did produce some inherent errors in that a given address may not always lie in the zone whose centroid is the closest. However, for the purposes of analyzing trip length frequency distributions, the errors tend to be self-compensating and should not bias the results to any significant extent.

Six stratifications were used for this analysis as follows:

<u>Stratification</u>	<u>Axle Class</u>	<u>Weight Class</u>
1	2	6,000-10,000lbs.
2	2	Over -10,000lbs.
3	3	6,000-20,000lbs.
4	3	Over -20,000lbs.
5	4+	6,000-30,000lbs.
6	4+	Over -30,000lbs

Note: Only B.E. trucks were included in this analysis.

In a network analysis such as this, zone to zone times and distances are determined by tracing minimum time paths through the network. This tends to favor freeway use and produce paths which have longer distances but shorter times than would be the case if minimum distance were the criterion. The effect is even more marked in this study since the network contained off-peak auto speeds. The overall effect has been to produce higher average distances than those found from the actual survey data and lower average travel times. While these factors do not affect any comparative conclusion which may be taken from the analysis they should be considered in any absolute quantitative analysis.

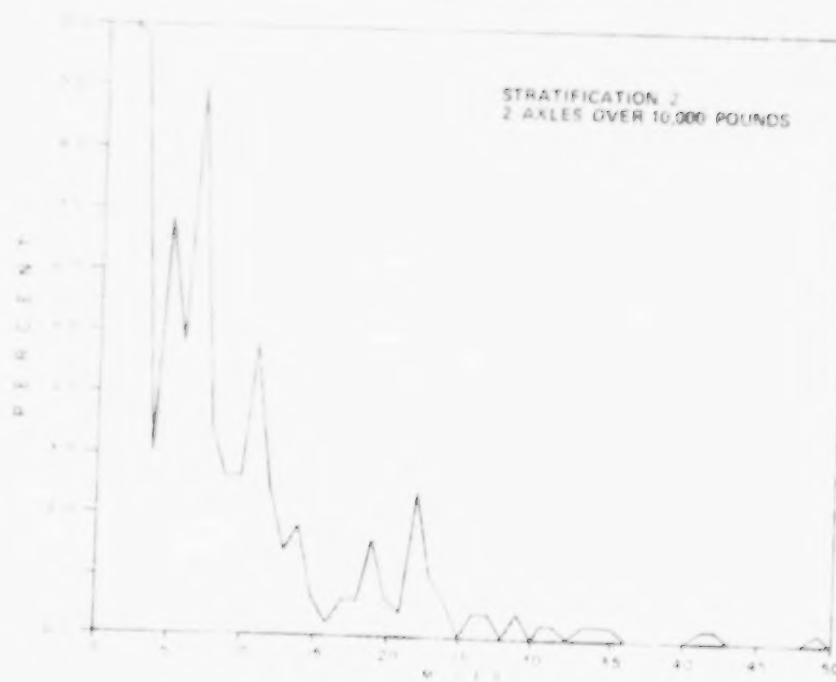
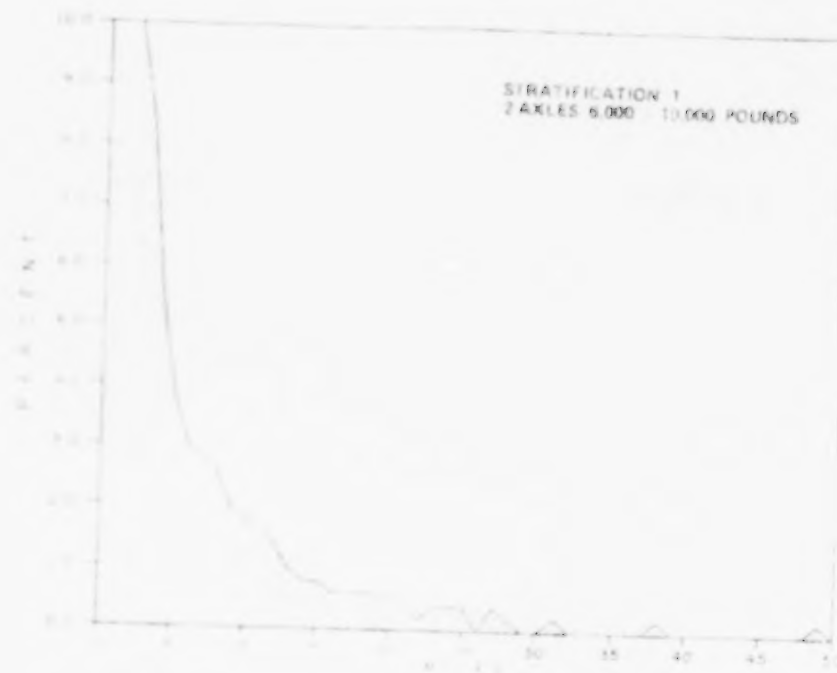
The survey data contained the drivers' estimated trip time for each trip. The network trip time distributions from the network analysis were therefore checked against those presented before from the interview data (see Figure 25, 26 and Appendix Table A-2). Within the limitations of the network analysis procedure as described above, the results showed satisfactory agreement and thus only the trip time analysis from the survey has been used.

Trip distance however was not recorded, since only the total mileage for the day was requested. Therefore, the trip distance distributions from the network analysis are presented here and are summarized in Table 15 , 16 , and 17 . The results are illustrated in Figures 32 through 34. As can be seen from a comparison with Table 11 , average trip lengths are longer here than found from the mileage statistics. With the two-axle trucks in particular making may (about 50 per cent) short journeys, errors in rounding distances to nearest mile would account for much of this as well as the distance-time tradeoff discussed above.

These results allow important comparisons to be made between the different classifications. In particular the longer journey characteristics of the larger trucks is readily apparent.

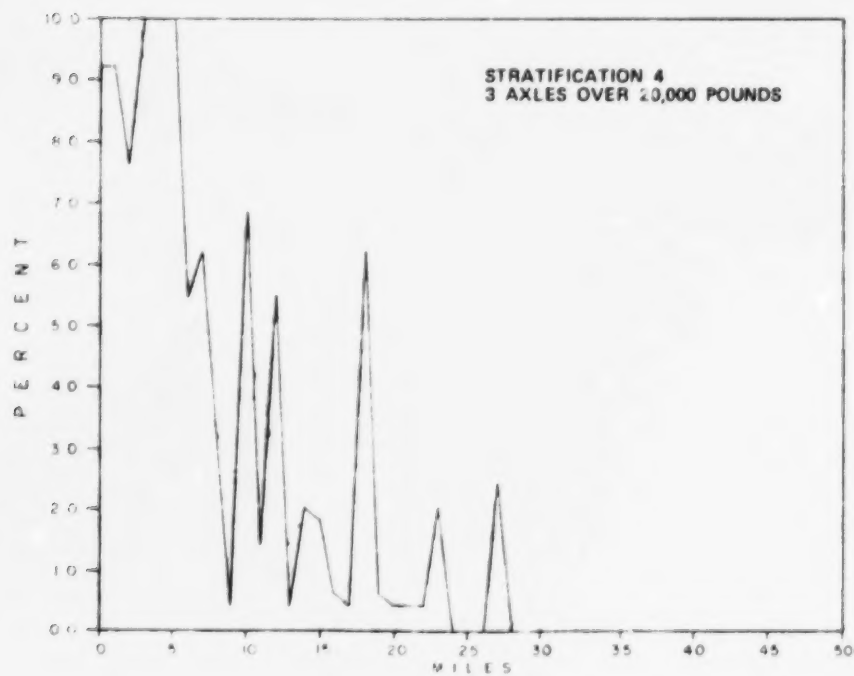
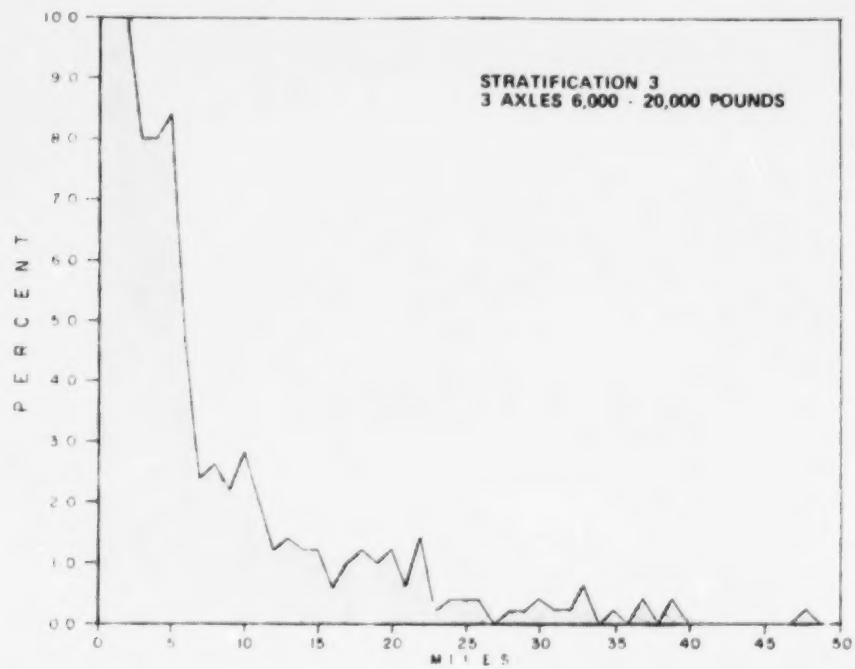
Summary of Truck Usage

It is appropriate at this point to summarize the characteristics of trucks and their usage which have been outlined thus far. It is clear that an important stratification of truck use



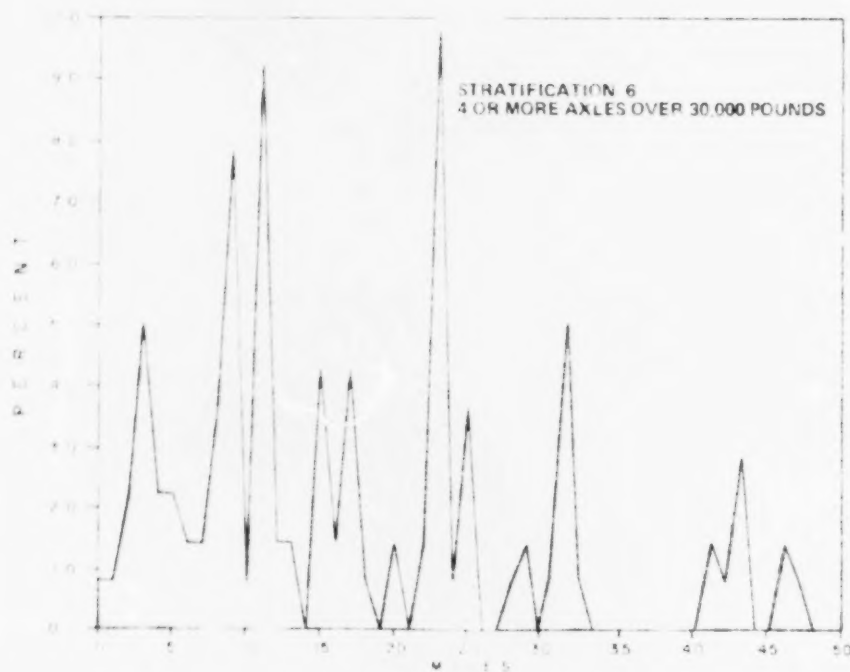
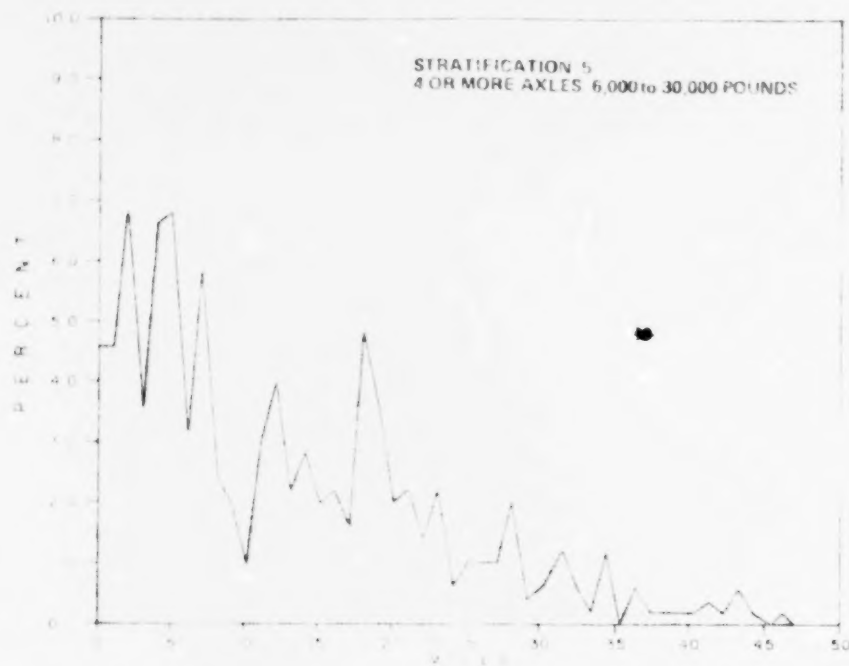
LOS ANGELES DATA
TRIP LENGTH FREQUENCY DISTRIBUTION
STRATIFICATIONS 1 AND 2

FIGURE 32



**LOS ANGELES DATA
TRIP LENGTH FREQUENCY DISTRIBUTION
STRATIFICATIONS 3 AND 4**

FIGURE 33



LOS ANGELES DATA
TRIP LENGTH FREQUENCY DISTRIBUTION
STRATIFICATIONS 5 AND 6

FIGURE 34

Table 15

TRIP LENGTH DISTRIBUTION

DISTRICT	STRATIFICATION 1			STRATIFICATION 2		
	Volume	Per Cent	Cumulative Per Cent	Volume	Per Cent	Cumulative Per Cent
1	1835	43.2	43.2	138	23.5	23.5
2	605	14.3	57.5	65	11.1	34.6
3	359	8.5	66.0	57	9.7	44.4
4	231	5.4	71.4	18	3.1	47.4
5	162	3.8	75.2	40	6.8	54.3
6	131	3.1	78.3	28	4.7	59.0
7	118	2.8	81.1	53	9.0	68.1
8	107	2.5	83.6	20	3.4	71.5
9	84	2.0	85.6	15	2.6	74.1
10	76	1.8	87.4	15	2.6	76.6
11	71	1.7	89.0	28	4.8	81.4
12	57	1.3	90.4	14	2.4	83.8
13	43	1.0	91.4	8	1.4	85.2
14	30	.7	92.1	11	1.9	87.0
15	38	.9	93.0	4	.7	87.7
16	23	.5	93.5	1	.2	87.9
17	23	.5	94.1	4	.7	88.6
18	23	.5	94.6	4	.7	89.2
19	25	.6	95.2	9	1.5	90.8
20	24	.6	95.8	3	.5	91.3
21	20	.5	96.3	2	.3	91.6
22	12	.3	96.5	14	2.4	94.0
23	15	.3	96.9	6	1.0	95.1
24	17	.4	97.3	3	.5	95.6
25	14	.3	97.6	0	0.0	95.6
26	4	.1	97.7	2	.3	95.9
27	13	.3	98.0	2	.3	96.2
28	9	.2	98.2	0	0.0	96.2
29	2	.0	98.0	2	.3	96.6
30	4	.1	98.4	0	0.0	96.6
31	5	.1	98.5	1	.2	96.8
32	2	.0	98.5	1	.2	96.9
33	1	.0	98.6	0	0.0	96.9
34	2	.0	98.6	1	.2	97.1
35	3	.1	98.7	1	.2	97.3
36	3	.1	98.8	1	.2	97.4
37	0	0.0	98.8	0	0.0	97.4

Table 15 (Cont'd)

DISTRICT	STRATIFICATION 1			STRATIFICATION 2		
	Volume	Per Cent	Cumulative Per Cent	Volume	Per Cent	Cumulative Per Cent
38	5	.1	98.9	0	0.0	97.4
39	0	0.0	98.9	0	0.0	97.4
40	1	.0	98.9	0	0.0	97.4
41	3	.1	99.0	0	0.0	97.4
42	0	0.0	99.0	1	.2	97.6
43	0	0.0	99.0	1	.2	97.8
44	2	.0	99.0	0	0.0	97.8
45	1	.0	99.0	0	0.0	97.8
46	1	.0	99.1	0	0.0	97.8
47	4	.0	99.2	0	0.0	97.8
48	2	.0	99.2	0	0.0	97.8
49	8	.1	99.4	0	0.0	97.8
50-158	26	61.3	100.0	13	2.3	100.0
TOTAL	4244	100.0		586	100.0	

Total Skim-Volume Units 20551.64
Average Trip in Unit 4.84

Total Skim-Volume Units 4639.45
Average Trip in Unit 7.92

Table 16

TRIP LENGTH DISTRIBUTION

DISTRICT	STRATIFICATION 3			STRATIFICATION 4		
	Volume	Per Cent	Cumulative Per Cent	Volume	Per Cent	Cumulative Per Cent
1	524	26.3	26.3	27	9.2	9.2
2	312	15.7	42.0	22	7.5	16.8
3	160	8.0	50.0	36	12.3	29.1
4	158	7.9	57.9	29	9.9	39.0
5	167	8.4	66.3	43	14.7	53.8
6	90	4.5	70.8	16	5.5	59.2
7	46	2.3	73.1	18	6.2	65.4
8	51	2.6	75.7	9	3.1	68.5
9	42	2.1	77.8	1	.3	68.8
10	55	2.8	80.6	20	6.8	75.7
11	41	2.0	82.6	4	1.4	77.0
12	24	1.2	83.8	16	5.5	82.5
13	28	1.4	85.2	1	.3	82.9
14	22	1.1	86.3	6	2.1	84.9
15	22	1.1	87.4	5	1.7	86.6
16	13	.6	88.1	2	.7	87.3
17	21	1.0	89.2	1	.3	87.7
18	23	1.2	90.3	18	6.2	93.8
19	20	1.0	91.3	2	.7	94.5
20	24	1.2	92.5	1	.3	94.9
21	12	.6	93.1	1	.3	95.2
22	29	1.4	94.6	1	.3	95.5
23	4	.2	94.8	6	2.1	97.6
24	6	.3	95.1	0	0.0	97.6
25	9	.4	95.5	0	0.0	97.6
26	8	.4	95.9	0	0.0	97.6
27	0	0.0	95.9	7	2.4	100.0
28	4	.2	96.1	0	0.0	100.0
29	4	.2	96.3	0	0.0	100.0
30	7	.4	96.7	0	0.0	100.0
31	2	.1	96.8	0	0.0	100.0
32	2	.1	96.9	0	0.0	100.0
33	10	.5	97.4	0	0.0	100.0
34	1	.0	97.4	0	0.0	100.0
35	2	.1	97.5	0	0.0	100.0
36	1	.1	97.6	0	0.0	100.0
37	7	.4	97.9	0	0.0	100.0
38	0	.0	98.0	0	0.0	100.0
39	8	.4	98.3	0	0.0	100.0
40	1	.1	98.4	0	0.0	100.0

Table 16 (Cont'd)

DISTRICT DISTRICT	STRATIFICATION 3			STRATIFICATION 4		
	Volume	Per Cent	Cumulative Per Cent	Volume	Per Cent	Cumulative Per Cent
41	0	0.0	98.4	0	0.0	100.0
42	0	0.0	98.4	0	0.0	100.0
43	1	.1	98.4	0	0.0	100.0
44	1	.1	98.5	0	0.0	100.0
45	1	.1	98.5	0	0.0	100.0
46	0	0.0	98.5	0	0.0	100.0
47	1	.1	98.6	0	0.0	100.0
48	2	.1	98.7	0	0.0	100.0
49	0	0.0	98.7	0	0.0	100.0
50-158	26	2.3	100.0	0	0.0	100.0
	1,992	100.0		292	100.0	

Total Skim-Volume Units 13983.79
Average Trip in Unit 7.02

Total Skim-Volume Units 2218.80
Average Trip in Unit 7.60

Table 17

TRIP LENGTH DISTRIBUTION

DISTRICT	STRATIFICATION 5			STRATIFICATION 6		
	Volume	Per Cent	Cumulative Per Cent	Volume	Per Cent	Cumulative Per Cent
1	40	4.5	4.5	1	.7	.7
2	61	6.9	11.4	3	2.1	2.8
3	32	3.6	15.0	7	4.9	7.7
4	59	6.6	21.6	3	2.1	9.8
5	60	6.8	28.4	3	2.1	12.0
6	29	3.3	31.6	2	1.4	13.4
7	51	5.7	37.4	2	1.4	14.8
8	21	2.4	39.8	5	3.5	18.3
9	18	2.0	41.8	11	7.7	26.0
10	9	1.0	42.8	1	.7	26.8
11	26	2.9	45.7	13	9.2	35.9
12	35	3.9	49.7	2	1.4	37.3
13	19	2.1	51.8	2	1.4	38.7
14	24	2.7	54.5	0	0.0	38.7
15	18	2.0	56.5	6	4.2	42.9
16	19	2.1	58.7	2	1.4	44.4
17	14	1.6	60.2	6	4.2	48.6
18	43	4.8	65.1	1	.7	49.3
19	32	3.6	68.7	0	0.0	49.3
20	17	1.9	70.6	2	1.4	50.7
21	20	2.2	72.9	0	0.0	50.7
22	13	1.5	74.3	2	1.4	52.1
23	19	2.1	76.5	14	9.8	62.0
24	6	.7	77.1	1	.7	62.7
25	8	.9	78.0	5	3.5	66.2
26	9	1.0	79.1	0	0.0	66.2
27	8	.9	80.0	0	0.0	66.2
28	18	2.0	82.0	1	.7	66.9
29	4	.4	82.4	2	1.4	68.3
30	5	.6	83.0	0	0.0	68.3
31	8	.9	83.9	1	.7	69.0
32	11	1.2	85.1	7	4.9	73.9
33	5	.6	85.7	1	.7	74.6
34	1	.1	85.8	0	0.0	74.6
35	11	1.2	87.0	0	0.0	74.6
36	0	0.0	87.0	0	0.0	74.6
37	5	.6	87.6	0	0.0	74.6
38	1	.1	87.7	0	0.0	74.6
39	1	.1	87.8	0	0.0	74.6
40	1	.1	88.0	0	0.0	74.6

Table 17 (Cont'd)

<u>DISTRICT</u>	<u>STRATIFICATION 5</u>			<u>STRATIFICATION 6</u>		
	<u>Volume</u>	<u>Per Cent</u>	<u>Cumulative Per Cent</u>	<u>Volume</u>	<u>Per Cent</u>	<u>Cumulative Per Cent</u>
41	2	.2	88.1	0	0.0	74.6
42	3	.3	88.5	2	1.4	76.0
43	2	.2	88.7	1	.7	76.8
44	5	.6	89.3	4	2.8	79.6
45	2	.2	89.5	0	0.0	79.6
46	0	0.0	89.5	0	0.0	79.6
47	2	.2	89.8	2	1.4	81.0
48	0	0.0	89.8	1	.7	81.7
49	0	0.0	89.8	0	0.0	81.7
50-158	<u>93</u>	<u>10.2</u>	100.0	<u>26</u>	<u>18.3</u>	100.0
	888	100.0		142	100.0	

Total Skim-Volume Units 17127.71
Average Trip in Unit 19.29

Total Skim-Volume Units 4091.45
Average Trip in Unit 28.81

is by the number of axles. Further, there are many significant differences between B.E. and regular commercial trucks ranging from the composition of the respective truck fleets down to their load-carrying characteristics. In Table 18 the major aspects of trucks and their usage are outlined with comparisons between B.E. and regular commercial trucks.

The major consistency between and within the truck groups is the fact that the same basic relationship is found between axle classes for any characteristic of trucks or their usage. This means that the same tendencies between axle classes exist for both B.E. and regular commercial trucks. For instance, the same basic relationship is found between the axle groups for trucks in actual operation; daily truck trips, daily truck mileage, etc. For the most part, the characteristics of truck usage for 2- and 3- axle classes are not too disassociated, although the differences are significant. Contrastingly, there is a wide disparity for most truck-use characteristics between 3-axle and 4 or more axle trucks. This is partially caused by the fact that the latter class includes many trucks with at least 5 axles. The evidence also shows that a major cause for the disparity is

Table 18

SUMMARY OF TRUCK AND TRIP-MAKING CHARACTERISTICS
DEVELOPED FROM 1960 LARTS TRUCK ORIGIN-DESTINATION SURVEY

	<u>B.E.</u>	<u>REGULAR COMMERCIAL</u>
<u>Average Empty Weight (lbs.)</u>		
2-axle	8,507	8,626
3-axle	15,120	14,841
4 or more axles	24,692	22,151
<u>Distribution of Trucks by Axle Class (pct.)</u>		
2-axle	44.9	73.6
3-axle	29.5	13.8
4-axle	25.6	12.6
<u>Percentage of Trucks in actual operation (pct.)</u>		
2-axle	60	86
3-axle	71	93
4-axle	75	91
All axles	67	87
<u>Average Truck Trips per day (number)</u>		
2-axle	16.1	9.3
3-axle	13.1	7.9
4-axle	6.3	6.3
All axles	12.7	8.7
<u>Average Daily Truck Mileage (miles)</u>		
2-axle	69.3	59.7
3-axle	80.8	66.4
4-axle	149.3	118.1
All axles	93.9	68.0

Table 18 (Cont'd)

	<u>B.E.</u>	<u>REGULAR COMMERCIAL</u>
<u>Average Trip Mileage (miles)</u>		
2-axle	4.3	6.4
3-axle	6.2	8.4
4-axle	23.6	18.9
All axles	7.4	7.8
<u>Average Trip Travel Time (minutes)</u>		
2-axle	14.7	17.5
3-axle	22.4	24.8
4-axle	53.0	42.4
All axles	22.0	20.6
<u>Average Trip Speed (mph)</u>		
2-axle	17.6	21.9
3-axle	16.6	20.3
4-axle	26.7	26.7
All axles	20.2	22.7
<u>Average daily hours of operation (hours)</u>		
2-axle	3.9	2.7
3-axle	4.9	3.3
4-axle	5.6	4.5
All axles	4.7	3.0
<u>Average Commodity-weight delivered (lbs.)</u>		
2-axle	1,733	1,112
3-axle	16,713	6,170
4-axle	31,442	17,558
All axles	8,354	2,877
<u>Percentage of Trips commodity delivered (pct.)</u>		
2-axle	75	75
3-axle	53	65
4-axle	56	60
All axles	67	72

a largely different pattern of usage above the 3-axle truck class.

In the foregoing analyses, the truck-use relationships were not stratified by empty weights of trucks. This deletion allowed a more concise presentation of the survey results. In the following discussion, the relationships are stratified by empty weight class of trucks and the attempt will be to identify where empty weight has an effect on the pattern of truck usage.

Stratification of Truck Usage by Empty Weight

The key point in the analysis of truck use stratified by empty weight is the identification of the truck-use characteristics which are affected by variable empty weight and the degree of the effect. It will be most useful, therefore, to focus upon variable empty weight within axle classes to determine the effects, if any on truck usage. It is important also to draw comparisons between the B.E. and regular commercial truck groups in order to identify any significant differences.

In the following tables, the values of the truck-use characteristics developed in the previous analysis are given for the range of empty truck weight classes. Each table summarizes the

values for a particular number of truck axles. The tables also contain the percentage distributions of B.E. and regular commercial trucks by empty weight class within each axle class. The percentages within each empty weight class provide the proper perspective in assessing the importance of the relationships developed. In this regard, it is seen that over 80 per cent of all 2-axle trucks are in the 6-10,000 lb range; significant proportions of 3-axle trucks are found in the 6-25,000 weight classes; and 4 or more axle trucks are concentrated between 15,000 and 35,000 lbs. A review of the data in Table 19 and 20 , and 21 shows the following:

1. Overall, the daily number of truck trips is not significantly affected for each class of truck by axle number over the range of empty weights. In a few cases, specifically 2-axle trucks of both truck groups and B.E. 3-axle trucks, there appears to be a slight decrease in truck trips as a function of empty weight.
2. Total daily truck mileage is affected differently for each axle class as a function of empty weight.

Table 19

SUMMARY OF TRUCK USE CHARACTERISTICS FOR 2-AXLE B.E. AND REGULAR COMMERCIAL TRUCKS
STRATIFIED BY EMPTY WEIGHT OF TRUCK

TRUCK-USE RELATIONSHIP	B.E./ REGULAR COMMERCIAL TRUCKS (B.E./R.C.)	Average or No.	EMPTY WEIGHT CLASSES (in thousands of pounds)					
			6-10	10-15	15-20	20-25	25-30	30-35 35+
Average Daily Truck Trips	B.E. R.C.	16.1 9.3	16.7 9.3	13.3 9.2	9.8 10.1	10.0 1.5	- 6.0	- -
Average Daily Truck Mileage (miles)	B.E. R.C.	69.3 59.7	67.7 58.9	77.2 61.9	52.2 71.4	250.0 13.5	- 122.0	- -
Average Trip Mileage (miles)	B.E. R.C.	4.3 6.4	4.0 6.3	5.8 6.7	5.4 7.1	25.0 9.0	- 20.3	- -
Average Trip Travel Time (minutes)	B.E. R.C.	14.7 17.5	13.7 17.4	22.5 17.5	22.2 17.6	51.5 43.3	- 39.7	- -
Average Trip Speed (mph)	B.E. R.C.	17.6 21.9	17.5 21.7	15.5 23.0	14.6 24.2	29.1 12.5	- 30.7	- -
Average Daily Hours of operation (hours)	B.E. R.C.	3.9 2.7	3.8 2.7	5.0 2.7	3.6 3.0	8.6 1.1	- 4.0	- -
Average Commodity-Weight Delivered (pounds)	B.E. R.C.	1,733 1,112	1,117 1,073	6,514 1,432	509 596	36,000 10,000	- 1,491	- -
Percentage of Trips Commodity Delivered	B.E. R.C.	75 75	75 76	79 70	77 77	50 33	- 83	- -
Percentages of Trucks by Weight Class	B.E. R.C.	100.0 100.0	84.8 80.3	13.8 16.3	1.2 2.8	0.3 0.4	- 0.2	- -

Table 20
SUMMARY OF TRUCK USE CHARACTERISTICS FOR 3-AXLE I.E. AND REGULAR COMMERCIAL TRUCKS
STRATIFIED BY EMPTY WEIGHT OF TRUCK

TRUCK-USE RELATIONSHIP	B.E./ REGULAR COMMERCIAL TRUCKS (B.E./R.C.)	Average or No.	EMPTY WEIGHT CLASSES (in thousands of pounds)						
			6-10	10-15	15-20	20-25	25-30	30-35	35+
Average Daily Truck Trips	B.E. R.C.	13.1 7.9	19.3 7.0	10.9 8.6	13.9 7.5	14.0 9.2	4.0 2.0	- 4.0	12.0 -
Average Daily Truck Mileage (miles)	B.E. R.C.	80.8 66.4	89.3 52.7	84.5 70.6	77.0 65.0	51.8 79.6	35.0 18.0	- 51.0	428.0 -
Average Trip Mileage (miles)	B.E. R.C.	6.2 8.4	4.6 7.5	7.8 8.2	5.5 8.7	3.7 8.7	17.5 9.0	- 12.7	35.7 -
Average Trip Travel Time (minutes)	B.E. R.C.	22.4 24.8	13.7 24.4	25.0 25.1	23.5 23.0	22.5 28.3	150.0 40.0	- 45.0	44.0 -
Average Trip Speed (mph)	B.E. R.C.	16.6 20.3	20.1 18.4	18.7 19.6	14.0 22.7	9.9 18.4	7.0 13.5	- 16.9	48.7 -
Average Daily Hours of Operation (hours)	B.E. R.C.	4.9 3.3	4.4 2.8	4.5 3.6	5.4 2.9	5.3 4.4	5.0 1.3	- 3.0	8.8 -
Average Commodity-Weight Delivered (pounds)	B.E. R.C.	16,713 6,170	4,781 1,561	15,917 5,468	18,279 6,174	23,246 18,661	20,000 -	- -	51,000 -
Percentage of Trips Commodity Delivered	B.E. R.C.	53 65	31 80	56 63	63 66	50 59	50 0	50 0	- -
Percentage of Trucks by Weight Class	B.E. R.C.	100.0 100.0	12.8 11.0	40.9 46.2	29.4 31.9	15.8 8.8	0.4 1.1	- 1.1	0.4 -

Table 21

SUMMARY OF TRUCK USE CHARACTERISTICS FOR 4- OR MORE AXLE B.E. AND REGULAR COMMERCIAL TRUCKS STRATIFIED BY EMPTY WEIGHT OF TRUCK

TRUCK-USE RELATIONSHIP	B.E./ REGULAR COMMERCIAL TRUCKS (B.E./R.C.)	Average or No.	EMPTY WEIGHT CLASSES (in thousands of pounds)									
			6-10	10-15	15-20	20-25	25-30	30-35	35+			
Average Daily Truck Trips	B.E. R.C.	6.3 6.3	11.7 3.7	9.3 15.5	5.8 3.6	8.5 7.3	5.6 5.8	5.3 3.0	3.2 8.0			
Average Daily Truck Mileage (miles)	B.E. R.C.	149.3 118.1	51.7 59.0	57.1 71.3	86.8 102.4	153.1 114.9	182.1 129.2	191.7 192.7	113.3 233.0			
Average Trip Mileage (miles)	B.E. R.C.	23.6 18.9	4.4 16.1	6.2 4.6	15.0 28.1	18.0 15.6	32.7 22.2	36.4 64.2	35.4 29.1			
Average Trip Travel Time (minutes)	B.E. R.C.	53.0 42.4	26.9 58.2	34.1 26.9	41.0 48.1	47.1 36.7	61.4 47.0	70.0 100.1	85.8 79.4			
Average Trip Speed (mph)	B.E. R.C.	26.7 26.7	9.8 16.6	10.9 10.3	22.0 35.0	22.9 25.5	32.0 15.6	31.2 38.5	24.8 22.0			
Average Daily Hours of Operation (hours)	B.E. R.C.	5.6 4.5	5.2 3.6	5.3 6.9	4.0 2.9	6.7 4.5	5.7 4.5	6.2 5.0	4.6 10.6			
Average Commodity-Weight Delivered (pounds)	B.E. R.C.	31,442 17,558	3,192 4,500	18,253 7,796	8,733 11,251	37,835 17,588	39,666 21,904	46,416 23,105	40,850 42,953			
Percentage of Trips Commodity Delivered	B.E. R.C.	56 60	49 9	62 40	71 67	50 67	55 63	49 33	63 38			
Percentages of Trucks by Weight Class	B.E. R.C.	100.0 100.0	4.0 4.8	6.0 8.4	13.9 16.8	24.0 33.6	35.0 28.8	12.9 4.8	6.4 2.4			

The distribution of average daily mileage for 2-axle trucks in Table 19 by empty weight increases slightly with increasing empty weight. In contrast, the daily truck mileage of 3-axle B.E. trucks decreases with increasing truck empty weight. The 4- or more axle trucks show an even greater tendency as a function of truck empty weight. These relationships indicate that the trip purposes of B.E. 2-axle and all 4 or more axle trucks lead to greater traveling distance with increasing truck empty weight.

3. Average trip mileage is a function of the daily trip and daily mileage characteristics outlined in 1. and 2. above. The results show an overall increase in the average trip mileage with increasing truck empty weights within each axle class.
4. Average trip travel-time also increases with increasing truck empty weight within each class.

This would be expected as a result of the general relationship found for average trip mileage.

5. Average trip speed is a function of the trip time and mileage characteristics summarized in 3. and 4. above. The results show a mixed situation between the three classes of axles in that some increases in speed are found as a function of empty weight and in others the opposite effect is found. The most significant increase in average speed with increasing empty weight is seen for B.E. 4 or more axle trucks in Table 21. Three-axle B.E. trucks on the other hand show a significant decrease in average speed as function of empty weight.
6. Average daily hours of truck operation by axle class appear to generally increase with increasing truck empty weight. This tendency is slightly clearer for B.E. trucks than for regular commercial trucks in each axle class.

7. Average commodity-weight carried is the truck-use characteristic most affected by variable empty weight. For each of the axle classes, significant increases are seen for average commodity weight over the range of truck empty weight.
8. Within each axle class, the percentage of trips in which a commodity is delivered is not affected in any consistent way by increasing empty weight. The values of this characteristic across empty weight classes are within several percentage points of the respective averages with no discernible pattern.

In summary, the above enumeration of the general effects of variable truck empty weight on truck usage shows that empty weight is not as significant as number of axles in determining truck usage. Empty weight has a large effect on the average weight delivered as do the number of truck axles. However, the analysis of empty weight within each truck axle class provides

a greater understanding of truck-use patterns and the basic causes of differences within particular axle classes.

Chapter 4

GEOGRAPHIC CHARACTERISTICS OF TRUCK USAGE LOS ANGELES BASIN

The geographic distributions of truck operations describe the spatial pattern of truck usage. Differing patterns of truck usage are found throughout the Los Angeles Basin. This conclusion can be drawn from the data obtained in several truck surveys along the highways in the region. The results show that the distribution of trucks by axle class varies from a predominance of 2-axle trucks in some areas to a predominance of 4- or more axle trucks in others. By comparing the types of roadways and their relationship to the overall land use in the region, an understanding of truck operations can be derived, and used in the development of representative truck-use patterns.

The primary data obtained in the several truck surveys are the distribution of trucks by total number of axles. These data are analogous to the basic truck characteristics obtained in the 1960 LARTS Truck Study described in Chapter 3. The highway truck surveys used in this study are as follows:

1. 1963 Truck Classification Counts (approximately 260 locations.)
2. 1968 Truck Weight Survey (7 locations).
3. 1970 Truck Classification Counts (15 locations).

4. 1971 Heavy Commercial Vehicle Survey (6 locations).

As mentioned above, the common data obtained in these surveys were the distribution of trucks by total number of axles. This was the only information obtained in the 1963 and 1970 Truck Classification Counts. The 1968 and 1971 surveys obtained further information regarding the composition of trucks (single-unit, truck and trailer, etc.) and their gross and empty weight characteristics. Hence, the 1968 and 1971 surveys provide the main linkages between survey data (obtained on the basis of total truck axles) and truck population data (available on a truck component basis).

The following discussion and analysis reviews the spatial characteristics of truck usage and in particular focuses on two important questions:

1. What are the differences in truck use throughout the Los Angeles Basin and what consistencies exist between the characteristics and the types of roadways in the region?
2. To what extent can the information from the highway surveys be used in interpreting present truck-use relationships from the present population of trucks as given by the truck registration date?

It should be noted that the highway truck surveys did not differentiate trucks on the basis of B. E. or regular commercial truck registration (with the exception of the 1971 Heavy Commercial Vehicle Survey). This should be remembered in reviewing the following analysis and in comparing the results with other data presented in this report.

Overview of Truck Operations

The truck classification surveys in 1963, 1968, 1970 and 1971, which trucks were classified by total number of axles, show the different patterns of truck use throughout the Los Angeles Basin. In general, a higher concentration of light trucks (e. g. 2-axle) are found in the more urbanized areas of the region. Moving away from these urbanized areas, the proportion of light trucks decreases to a very low level in remote areas. Conversely, the proportion of heavy trucks (i.e., 4- or more axles) tends to be lower in the urban areas and high in the remote areas. The differences appear to be a function of the type of roadways and the activities which they connect. The distinction can be drawn most clearly between an inter-city freeway and an arterial roadway within an urban residential area. For these examples, the surveys show high proportions of heavy trucks on the inter-city links and low proportions on residential arterials. Just the opposite relationship is found for the lighter, 2-axle trucks.

The basic relationship outlined above holds over the time period between 1963 and 1970. That is, the distribution of trucks by axle class has maintained approximately constant on highway links within the region which connect activities that have not changed in character. In order to illustrate this point, a comparison is presented in Table 22 showing the distribution of trucks by axle class at 23 points as indicated in Figure 35.

It should be noted that the 1963 survey did not stratify trucks of 4- or-more axles while the later surveys did obtain a higher stratification.⁽¹⁾

The comparison points have been arranged into three groups -- inter-city rural, inter-city urban, and urban. These classifications of the different highway links have been defined for this study to use in the comparison of truck distributions. The points named as inter-city rural are basically gateway points to the Los Angeles Basin; the inter-city urban points are internal to the region but are those which could be expected to carry a large proportion of inter-city movements; the urban points are those which are likely to carry a variety of local truck traffic.

A comparison of the axle class distributions between 1963

(1) It was indicated in 1963 Truck Classification Survey report that 77 percent of all trucks in the 4- or-more axle class were 5-axle trucks.

Table 22

SUMMARY OF TRUCK AXLE PERCENTAGE DISTRIBUTIONS AT 23 POINTS -

COMPARISON 1963 AND 1970

LOCATION AND TYPE OF ROADWAY		1963 NUMBER OF AXLES				1970 NUMBER OF AXLES			
Roadway Type	Location (See Fig. 4-1)	2	3	4 or more	TOTAL	2	3	4	5 or more
INTER-CITY									
RURAL HIGHWAYS									
	16	15	8	77	100	16	8	5	70
	17	*	*	*	*	26	8	5	59
	18	25	12	63	100	22	8	7	61
	20	30	22	48	100	38	15	8	38
	23	33	15	52	100	16	17	12	54
INTER-CITY									
URBAN HIGHWAY									
	1	45	20	35	100	44	12	7	36
	10	36	15	49	100	38	11	6	44
	11	61	24	15	100	23	9	4	53
	12	*	*	*	*	47	11	9	32
	14	20	15	65	100	51	10	6	32
	19	29	14	57	100	28	10	7	53
BASICALLY									
URBAN HIGHWAYS									
	2	44	15	41	100	46	16	7	30
	3	49	18	33	100	35	11	5	48
	4	40	12	48	100	43	15	7	34
	5	49	12	39	100	50	10	5	34
	6	61	12	27	100	62	15	4	18
	7	77	14	9	100	39	12	5	43
	8	57	13	30	100	65	15	4	16
	9	63	17	20	100	51	14	4	30
	13	51	12	37	100	56	11	6	26
	15	58	19	23	100	50	14	5	30
	**21	65	12	23	100	52	21	6	21
	**22	40	15	45	100	24	21	6	49

* Comparison data not available for 1963

** With the exception of these two locations, all highways are freeway facilities

Source: 1963 Truck Classification Count and 1970 Truck Classification Counts. (The 1970 counts are supplemented by 6 counts from the 1966 Survey, location nos. 14-21, and 3 counts from the 1971 Survey, location nos. 21-22.)

and 1970 can be seen by examining the proportion of 2-axle trucks. Using this basis for comparison, a review of the data in Table 22 shows that 10 points have similar proportions (within 5 percent) of 2-axle trucks between 1963 and 1970. Under the inter-city, rural type of roadway, these points are 16 and 18. The inter-city, urban highway links that have similar distributions of 2-axle trucks are points 1, 10, and 19. And finally, points 2, 4, 5, and 6 under the urban highway classification have similar percentages of 2-axle trucks surveyed both in 1963 and 1970. Further, the proportions of 3- and 4 or more axle trucks at each of these 10 points also show the same similarities.

Different percentage distributions of trucks between 1963 and 1970 at certain points can be explained by the changed function of certain roadways as results of either the creation of new routes between activity centers or changes in the composition of activity centers themselves. These changes shift both the direction and composition of truck traffic.

Therefore, it would be reasonable to assume for the purposes of this study that the comprehensive 1963 truck classification counts, updated with 1968, 1970 and 1971 data, generally describe the composition of truck traffic by axle class in the Los Angeles Basin. For reference, a compendium of the 1963 classification data is contained in the Appendix of this report.

Relationship Between Number of Truck Axles and Type of Vehicle

The 1968 Truck Weight Study in California investigated trucks on the basis of the number of total axles and the type of vehicle (single-unit, tractor-semitrailer, etc.). Most other surveys discussed in this report only obtained information on trucks by total number of axles. An examination of the truck axle and vehicle type relationships from the 1968 survey will provide some basis to relate other surveys to the actual composition of trucks. The main purpose of these relationships will be to relate truck survey data to the population of trucks available from registration files on a truck component basis.

A qualification is necessary regarding the potential of relating the vehicle types used in the 1968 survey to the population of truck components. The 1968 survey categorized all trucks into four types -- single-unit, tractor-semitrailer, truck and trailer, and trucks or tractors with two trailers. Recalling from Chapter 2 in this report, the truck population data are categorized according to 14 types, one of which is "tractors". The others are all "trucks" of one sort or another. It is not possible, therefore, to obtain precise relationships between components and combinations. However, for the purposes of this study, some reasonable approximations can be made. For example, it is known that many body types such as pickups are

primarily single-unit in their usage. Table 23 provides some information relating the use of body types in different combinations (vehicle types).

The results of the 1968 Truck Survey then provides information on the axle class and vehicle type relationships. The major consideration is the distribution of each axle class by vehicle type. Table 24 shows the percentages of trucks by vehicle type for each class of axles at 7 locations in the Los Angeles Basin. Some observations on the vehicle type relationships are as follows:

1. Almost all 3-axle trucks are either single-unit or tractor-semitrailer combinations. Only a very small percentage are truck and trailer combinations.
2. Four-axle trucks are seen to fall into all vehicle types, but the overwhelming proportion are tractor-semitrailer (80 percent or more). Truck and trailer combinations are the next most significant vehicle type of 4-axle trucks (5 to 20 percent).
3. There are significant proportions of 5-axle trucks in each vehicle type category (other than single-unit). Generally, 5-axle trucks are divided between tractor-semitrailers and two-trailer combinations with a lesser amount of truck and trailers.

TABLE 23

DISTRIBUTION BY TYPE OF VEHICLE AND TYPE OF BODY

TYPE OF BODY	TYPE OF VEHICLE			ALL VEHICLES	
	Truck*	Semi-trailer	Full trailer	Percent	Number
Flatbed	28.0	23.2	38.2	26.2	737
Rack	8.1	2.6	4.4	4.3	120
Van	43.0	59.8	6.6	49.2	1,385
End Dump	2.3	1.1	2.5	1.6	44
Bottom Dump	0.3	3.4	15.4	3.9	110
Tank - Solids	1.1	0.9	2.5	1.1	32
Tank - Fluids	9.9	3.9	22.9	7.7	216
(Log) Bunk	2.1	0.0	5.0	1.1	32
Vehicle Carrier	2.1	0.9	0.0	1.1	32
Container Chassis	2.1	3.7	2.5	3.2	89
Mobile Equipment	0.8	0.2	0.0	0.4	10
Other	0.2	0.3	0.0	0.2	6
All Types -					
Percent	100	100	100	100	-
Number	754	1,740	319	-	2,813

*Trucks include dromedary tractors.

SOURCE: The 1971 Heavy Commercial Vehicle Survey.

TABLE 24
PERCENTAGE DISTRIBUTION OF TRUCKS BY
TOTAL NUMBER OF AXLES WITHIN VEHICLE TYPE
AT VARIOUS SURVEY LOCATIONS IN
LOS ANGELES BASIN

SURVEY LOCATION (See Figure 4-1) AND TYPE OF VEHICLE	NUMBER OF TOTAL AXLES IN TRUCK COMBINATION					
	2	3	4	5	6	7
<u>LOCATION 13</u>						
Single-Unit	100	44	-	-	-	-
Tractor-Semitrailer	-	54	95	44	8	-
Truck and Trailer	-	2	5	31	31	-
Two-Trailer	-	-	-	25	61	-
Total	100	100	100	100	100	-
<u>LOCATION 16</u>						
Single-Unit	100	44	-	-	-	-
Tractor-Semitrailer	-	55	92	40	7	-
Truck and Trailer	-	1	8	13	29	-
Two-Trailer	-	-	-	47	64	100
Total	100	100	100	100	100	100
<u>LOCATION 17</u>						
Single-Unit	100	56	2	-	-	-
Tractor-Semitrailer	-	43	84	53	6	-
Truck and Trailer	-	1	14	19	29	-
Two-Trailer	-	-	-	28	65	100
Total	100	100	100	100	100	100
<u>LOCATION 18</u>						
Single-Unit	100	30	-	-	-	-
Tractor-Semitrailer	-	70	84	47	6	-
Truck and Trailer	-	*	15	26	29	-
Two-Trailer	-	-	1	27	65	100
Total	100	100	100	100	100	100
<u>SEE FIGURE 3-1</u>						
<u>LOCATION 19</u>						
Single-Unit	100	47	-	-	-	-
Tractor-Semitrailer	-	51	86	32	20	-
Truck and Trailer	-	2	14	24	20	-
Two-Trailer	-	-	-	44	60	100
Total	100	100	100	100	100	100
<u>LOCATION 20</u>						
Single-Unit	100	50	-	-	-	-
Tractor-Semitrailer	-	49	83	38	13	-
Truck and Trailer	-	1	17	18	13	-
Two-Trailer	-	-	-	44	74	-
Total	100	100	100	100	100	-
<u>LOCATION 21</u>						
Single-Unit	100	38	-	-	-	-
Tractor-Semitrailer	-	57	80	42	100	-
Truck and Trailer	-	5	20	13	-	-
Two-Trailer	-	-	-	45	-	-
Total	100	100	100	100	100	-

* Indicates less than 0.5 percent.

SOURCE: Derived from 1968 Truck Weight Study in California, California Division of Highways, Urban Planning Department and Federal Highway Administration.

4. In all cases of 6-axle trucks, more than 60 percent are two-trailer truck combinations. The others are distributed between tractor-semitrailers and truck and trailer combinations.
5. The small proportion of 7-axle trucks surveyed are all two-trailer truck combinations.

An overview of the data in Table 24 reveals a fairly consistent relationship between truck axles and vehicle types, particularly when it is considered that the survey locations are scattered throughout the Los Angeles Basin.

The 1968 survey data contained summaries of vehicles and axles by major highway classification for all of California. The highway classification summaries included some of the survey locations in the Los Angeles Basin, and the vehicle type and axle class relationships for those summaries are contained in Table 25.

From this table it can be seen that the same basic relationships are present. It is significant, though, that the percentage distributions for each axle class vary less between major road classifications than between individual survey locations as shown previously in Table 24.

TABLE 25

PERCENTAGE DISTRIBUTION OF TRUCKS BY
TOTAL NUMBER OF AXLES WITHIN VEHICLE TYPE,
SURVEY LOCATION SUMMARIES IN CALIFORNIA

SURVEY LOCATIONS AND TYPE OF VEHICLE	NUMBER OF TOTAL AXLES IN TRUCK COMBINATION					
	2	3	4	5	6	7
<u>RURAL CLASSIFICATION (1)</u>						
Single-Unit	100	39	*	-	-	-
Tractor-Semitrailer	-	60	89	37	8	-
Truck and Trailer	-	1	10	20	28	-
Two-Trailer	-	-	1	43	64	100
Total	100	100	100	100	100	100
<u>URBAN CLASSIFICATION (2)</u>						
Single-Unit	100	47	*	-	-	-
Tractor-Semitrailer	-	51	92	35	12	-
Truck and Trailer	-	2	8	22	29	-
Two-Trailer	-	-	-	43	59	100
Total	100	100	100	100	100	100
<u>OTHER RURAL CLASSIFICATION (3)</u>						
Single-Unit	100	44				
Tractor-Semitrailer	-	55	89	38	15	
Truck and Trailer	-	1	11	15	23	
Two-Trailer	-	-	-	47	62	100
Total	100	100	100	100	100	100

*Indicates negligible amount

(1) Includes survey location Nos. 16, 17, 18 and 20 in Figure 4-1.

(2) Includes survey location No. 13 in Figure 4-1.

(3) Includes Survey location Nos. 19 and 21 in Figure 4-1.

SOURCE: Derived from 1968 Truck Weight Study in California,
California Division of Highways, Urban Planning Department
and Federal Highway Administration.

Truck Weight and Load-Carrying Characteristics

Considerable truck weight information is available from the 1968 Truck Weight Study in California. The survey procedure included a sample of trucks that were weighed to obtain empty and gross weight data. This information was stratified by axle class and vehicle type as discussed in the previous section. A summary of the results according to the major highway classifications was given in Table 25. The complete results are contained in Table 26 and indicate the average total weight, average empty weight and average weight of load carried by vehicle type and axle class.

The data in Table 26, show the truck weight characteristics by major highway classifications. A comparison of the weight characteristics of each vehicle type and axle class between the highway classifications shows only marginal differences. The consistency is especially in the vehicle and axle classes which comprise a significant proportion of total trucks. For instance, single-unit, 2-axle trucks have average total weights and average empty weights of around 12,500 and 9,900 lbs., respectively, across the three highway classifications.

As would be expected from the earlier analyses in this report, the average empty weight of trucks is fairly consistent for each axle class and vehicle type. The "urban classification"

TABLE 26

SUMMARIES OF TRUCK WEIGHT CHARACTERISTICS FOR THREE HIGHWAY CLASSIFICATIONS IN CALIFORNIA

1968

TYPE OF TRUCK VEHICLE	RURAL CLASSIFICATION (1) 9 POINTS IN CALIF., INCLUDES 4 POINTS IN L. A. BASIN (2)				URBAN CLASSIFICATION (1) 3 POINTS IN CALIF., INCLUDES 1 POINT IN L. A. BASIN (3)				OTHER RURAL CLASSIFICATION (1) 4 POINTS IN CALIF., INCLUDES 2 POINTS IN L. A. BASIN (4)			
	Percent of Trucks	Avg. Total Weight	Percent Empty	Avg. Weight of Load	Percent of Trucks	Avg. Total Weight	Percent Empty	Avg. Weight of Load	Percent of Trucks	Avg. Total Weight	Percent Empty	Avg. Weight of Load
SINGLE-UNIT												
2-Axle, 6 Tire	20.00	12,810	33	9,900	40.10	12,530	24	9,870	17.60	12,770	32	9,900
3-Axle	3.10	26,110	46	18,700	5.50	27,180	52	19,490	3.20	27,830	37	18,500
4-Axle	.01	54,700	0	-	.01	54,000	0	-	.00	-	-	4,200
TRACTOR-SEMI-TRAILER												
3-Axle	4.70	27,020	22	20,410	6.00	25,510	25	19,410	4.00	27,850	25	19,290
4-Axle	4.40	36,530	19	22,870	4.70	32,000	38	24,110	3.90	36,500	25	23,110
5-Axle	24.30	51,040	29	28,180	15.00	46,580	35	27,780	26.20	56,870	16	28,530
6-or More Axles	.09	61,750	25	39,500	.04	40,300	50	32,600	.20	48,330	25	32,200
TRUCK AND TRAILER												
3-Axle	.05	25,400	0	-	.20	14,370	67	15,600	.07	28,400	0	-
4-Axle	.50	32,850	20	23,400	.40	50,920	11	20,400	.50	29,090	25	18,030
5-Axle	13.10	53,520	37	26,090	9.30	60,970	45	25,510	10.50	59,650	23	27,030
6-or More Axles	.30	51,070	50	28,460	.10	49,340	33	36,000	.30	69,190	7	32,000
TWO-TRAILER												
4-Axle	.00	-	-	-	.00	-	-	-	.00	-	-	-
5-Axle	28.50	52,270	35	27,280	18.60	52,500	31	27,310	.00	54,940	22	27,020
6-Axle	.70	49,180	24	25,460	.20	51,370	33	30,750	.80	63,760	4	35,700
7-or More Axles	.08	136,880	0	-	.02	33,200	100	33,200	.06	143,800	0	-
TOTAL PERCENT	100.00	-	-	-	100.00	-	-	-	100.00	-	-	-
TOTAL NUMBER	20,147	-	-	-	12,501	-	-	-	9,981	-	-	-

- (1) FHWA Highway Classifications
 (2) Survey Location Nos. 17, 18 and 26 in Figure 4-1
 (3) Survey Location Nos. 19 and 20 in Figure 4-1
 (4) Survey Location Nos. 19 and 21 in Figure 4-1

SOURCE: 1968 Truck Weight Study in California (California Division of Highways, Urban Planning Department and Federal Highway Administration).

figures from Table 26 are used to illustrate this point in Table 27. The consistency found in empty truck weight within each axle class and the differences between axle classes further support axle-class as a significant stratification of truck characteristics.

Table 27

AVERAGE EMPTY WEIGHT OF TRUCKS
BY AXLE CLASS AND VEHICLE TYPE

<u>Vehicle Type</u>	<u>2-Axle</u>	<u>3-Axle</u>	<u>Axle Class</u>		<u>6-Axle</u>	<u>7-Axle</u>
			<u>4-Axle</u>	<u>5-Axle</u>		
Single-unit	9,870	19,490				
Tractor-Semitrailer		19,410	24,110	27,780	32,600	
Truck and Trailer		15,600	20,400	25,510	36,000	
Two-Trailer				27,230	30,700	33,200

SOURCE: Data on average empty weight taken from Urban Highway Classification summary in Table 4-4.

A review of the survey summaries in Table 26 shows that there is not any consistent relationship demonstrated for the percentage of empty trucks either between highway classifications or between axle class and vehicle types.

Although the percentage of empty trucks appears to vary randomly between the highway classifications for each vehicle type and axle class, there is a reasonably consistent relationship

in average total weights (includes loaded and empty trucks) as found in Table 26 across highway classifications. The average weight of load carried is also similar in this respect. Thus, the differences in the percentages of empty trucks can be considered minor in their overall effect on average total weight of trucks.

An examination was also made to see whether there is a consistent relationship between average total weight and axle classes such as that found for empty truck weight in Table 26. Selecting the "urban classification" analysis, the average total weight values for the vehicle types and axle classes are shown in Table 28. It is seen that there are some large differences in the average total weight of trucks between vehicle types in each axle class. These variations would indicate a similar variation in the average weights of load carried.

Table 28

AVERAGE TOTAL WEIGHT OF TRUCKS
BY AXLE CLASS AND VEHICLE TYPE (LBS.)

<u>Vehicle Type</u>	<u>2-Axle</u>	<u>3-Axle</u>	<u>Axle Class</u>		<u>6-Axle</u>	<u>7-Axle</u>
			<u>4-Axle</u>	<u>5-Axle</u>		
Single-unit	12,530	27,180	54,000			
Tractor-Semitrailer		25,510	32,000	46,580	40,300	
Truck and Trailer		14,370	50,920	60,970	49,540	
Two-Trailer				52,500	51,370	33,200
Weighted Average Total Weight	12,530	26,105	38,632	52,266	50,297	33,200

SOURCE: Data on average total weight taken from Urban Highway Classification summary in Table 4-4.

These figures show the importance of axle class as an indicator of average total weight. Significant differences are seen between 2-, 3-, 4- and 5- axle trucks. Above 5 axles, the sample of trucks was so small that the figures for 6- and 7-axle trucks are not meaningful.

The values of average total weight by axle class are also very similar between the major highway classifications. Weighted averages for the "rural" and "other rural" classifications were compared with the values for the "urban" classification in Table 4-6 and no more than 10 percent difference was found within each class under 6-axles.

In summary, the weight characteristics of trucks stratified both by type of highway and by type of vehicle and axle class show many significant relationships. Two general conclusions which can be drawn from the analysis are the following:

1. Significant differences exist in the average empty weight of trucks by axle class. Within each axle class, there is consistency in average empty weight regardless of vehicle type.
2. Weighted averages of total truck weight show significant differences between axle classes.

Chapter 5

STATISTICAL STUDY FOR CORRELATIONS

An intensive study was undertaken to correlate truck characteristics between New York City and Los Angeles populations. The main thrust of this effort was concentrated on a search for correlation between the empty weight used in California with the gross vehicle weight used in New York, although other dissimilarities existed. Since neither state specifies both empty and gross weight on their registrations, an approach of statistically comparing weights was necessary.

Truck Inventory and Use Survey

The data base selected for this statistical approach was compiled by the Bureau of the Census and was based on the 1967 Census of Transportation Truck Inventory and Use Survey. This survey was undertaken by the Census Bureau to obtain data on the characteristics and use of commercial and private trucks in the 50 states and the District of Columbia. The survey consisted of sampling a population of trucks, mailing questionnaires to the truck owners of the selected sample, and compiling the results. A copy of this questionnaire is included as Appendix C.

The original census data compiled and available on the public use tape, did not contain the complete information that was needed for a careful and thorough analysis. Therefore, a modified tape was obtained from the Bureau of Census. This tape involved a search of the original survey forms and additional compiling and sorting to produce useful data. Additional information included was the original weight code used on the ques-

tionnaire and the census state code, both of which were necessary in order to determine the relationships between registered weights in California and New York.

This new data compiled was based on a probability sample of private and commercial trucks registered in a given state in 1967. The first stratification of the national sample was at the state level, and consisted of three levels based on total number of trucks registered annually. A sample of about 1500 truck registrations was drawn in small states, 3000 in intermediate, and 4500 in the larger states.

A second stratification was based on vehicle size as shown by the motor vehicle registration record. Two vehicle size strata were used--small and large. The dividing line between small and large trucks differed from state to state, depending upon the basis used for indicating vehicle size in registration records. Random sampling procedures were used to draw the sample from each of the two strata in each state.

The samples were drawn shortly after the close of the annual re-registration date in each state in order to have a list of license numbers and related mailing addresses. Since the timing of the re-registration cycle differed from state to state, two inventory dates were used, April 1 and July 1, 1967. This data represented a cross-section of all trucks throughout the country.

Empty and Gross Vehicle Weight Correlation

The next step was to determine truck characteristics in the Bureau of Census data that would completely distinguish a

given truck in both California and New York. For example, the area of operation would not define any particular properties of a truck that could be used to define common characteristics. This type of preliminary analysis also included the elimination of census data stratifications that contained numerous blanks.

It was found that the following six-vehicle characteristics would distinguish categories of trucks throughout the country, including New York and California.

1. Body Type (platform, van, dump, beverage, etc.)
2. Size or Capacity (feet, yards, cubic feet, cubic yards)
3. Vehicle Type (Single unit or tractor-trailer)
4. Axle arrangement
5. Vehicle Size (lt, med, lt-heavy, heavy)
6. Registered weight (gross or empty)

Next, all trucks in New York were sorted on the first five stratifications, their gross vehicle weight summed and an average weight calculated. This same procedure was followed in California, with the exception that the average weight was defined as the average empty weight. Table 29 gives examples of the combined state data.

It was next assumed that trucks in the New York data having the identical matching characteristics as the trucks in California were statistically the same. A statistical measure of similarities between empty and gross weight was thus provided. Some truck characteristics in one state were not matched in the other state. Trucks with these ambiguities were omitted. Table 30 shows examples of the combined data.

TABLE 29
EXAMPLE OF COMBINED TRUCKS IN STATE DATA

<u>STATE</u>	<u>BODY TYPE</u>	<u>LENGTH OR CAPACITY</u>	<u>VEHICLE TYPE</u>	<u>NUMBER OF AXLES</u>	<u>VEHICLE SIZE</u>	<u>NUMBER OF TRUCKS</u>	<u>AVERAGE WEIGHT</u>
N.Y	Dump	5 yds	SU (1)	2	Med	13	GVW
N.Y	Platform	36-41 ft	TT (2)	3	Hvy	25	35,000
N.Y	Platform	41 ft	TT	4	Hvy	10	53,000
Calif.	Dump	5 yds	SU	2	Med	50	EVW 15,600
Calif.	Platform	36-41	TT	3	Hvy	44	11,000

-
- (1) SU - Single Unit
(2) TT - Tractor Trailer

TABLE 30
COMBINED DATA

<u>TRUCK</u>	<u>LENGTH OR CAPACITY</u>	<u>VEHICLE TYPE</u>	<u>AXLES</u>	<u>VEHICLE SIZE</u>	<u>GVW</u>	<u>HEIGHT</u>	<u>EVW</u>
Dump	5 yds	SU	2	Med	35,000		15,600
Dump	5-6.9 Yds	SU	2	Hvy	39,000		16,940
Dump	15-19.9 yds	SU	3	Hvy	41,000		16,000
Platform	36-41 ft	TT	3	Hvy	42,500		10,000
Van	10-13 ft	SU	3	Lt	22,000		8,333
Van	28-36 ft	TT	3	Hvy	38,527		13,667
Liquid Tanker	3000-3999 Gallons	TT	4	Hvy	26,300		10,000

To accurately use empty weight to predict gross vehicle weight, stratifications of the new data base were made. For example, the first analysis performed, a linear regression, dealt with stratifying the data into two main classes; the first, all light, medium and light-heavy trucks; the second, all heavy trucks. Neither breakdown produced a high correlation between the weights. R in case one was .7968 and in case two was .0629. It is important to note that a low correlation coefficient does not indicate there is no relationship between empty and gross vehicle weight. In reality, there could be a nonlinear relationship.

To examining data for linear and nonlinear relationships, EVW and GVW were graphed for each stratification. This gave a diagnostic view of their true relationship. The graph of EVW and GVW for all heavy trucks revealed no relationship, linear or nonlinear, when stratified by light, medium and heavy categories, and therefore was not an adequate indicator to predict GVW by EVW. A similar procedure was followed throughout the selected stratifications. The three primary stratifications were based on truck categories, body types and truck lengths. Table 31 shows these stratifications as well as the correlation coefficient and equation used to predict the gross vehicle weight.

Conclusions of the Statistical Analysis

It was found that stratifying trucks based primarily on the type of truck (i.e. walk-in, cattlerack, etc.) produced the highest correlations between EVW and GVW. However, this was only true for the single-unit type. Correlations involving tractor-trailer truck types were not as high. These results are primarily

due to the wide variance possible in truck weights and load weights of longer trucks.

Truck length stratifications were high for the shorter length trucks, but, again, the longer trucks had poor correlation. Only approximately 50 per cent of the trucks in the data base were measured by length. The other 50 per cent were measured on the basis of their capacity.

Table 31 may be summarized as follows:

Some single-unit trucks categorized by approximate weight class (lt, med, heavy), body type and empty weight in California can be statistically related to trucks categorized by gross vehicle weight in New York City. However, only 84 per cent of the body types were commonly defined. Between 50 and 60 per cent of the tractor-trailer body types failed to produce satisfactory correlations in this stratification. The conclusion is that a satisfactory correlation for universal application does not exist between trucks defined by empty weight in California and by gross vehicle weight in New York.

As a verification of this conclusion as possibly applicable to other state pairing, the same procedure was used to test data for four other states: Texas and Ohio; and Michigan and Illinois. Comparable results were obtained.

Therefore, using the census data to formulate correlations between empty and gross weight did not produce the results that are required for large scale application. It would appear that if the initial data had been more complete and accurate, a higher predictive rate above 80 or 90 per cent could have been developed.

Table 31
REGRESSIONS

I <u>TRUCK CATEGORIES</u>		<u>R</u>	<u>Equation</u>
1.	Lt, Med, and Lt-Hvy Trucks	.7968	GVW = 2.08 EVW + 1,656
2.	Hvy Trucks	.0629	= -.30 EVW +57,973
3.	SU Trucks	.7645	= 2.71 EVW - 1,738
a.	SU 2 Axle	.7989	= 2.39 EVW - 541
b.	SU 2 Axle, Lt, and Med	.5287	= -.39 EVW +27,095
c.	SU 2 Axle, Lt-Hvy	.7956	= 1.66 EVW + 3,567
d.	SU 3 Axle	.6195	= 2.28 EVW + 6,111
4.	TT Trucks	.3455	= 1.44 EVW +43,569
a.	TT 3 Axle	.2562	= 3.04 EVW +21,337
b.	TT 4 Axle	.1224	= -.60 EVW +67,629
c.	TT More than 4 Axles	.1627	= .46 EVW +59,473

II <u>TRUCK BODY TYPES</u>		<u>R</u>	<u>EQUATION</u>
1.	SU Walk in	.8743	GVW =1.95 EVW + 2,675
2.	SU Cattle rack	.9960	= 1.51 EVW + 6,042
3.	SU Platform	.8853	= 2.52 EVW - 1,909
a.	SU Platform Lt	.9576	=-2.00 EVW +16,353
b.	SU Platform Med, Lt-Hvy, Hvy	.8946	= 3.49 EVW - 7,149
4.	SU Van	.8481	= 2.16 EVW + 756
5.	SU Beverage	.6960	= 1.48 EVW + 7,077
a.	SU Beverage Lt and Med	.9024	=-1.44 EVW +33,564
b.	SU Beverage Lt-Hvy	.9850	= .58 EVW +16,554
c.	SU Beverage Hvy	.9471	= 1.30 EVW +11,247

TABLE 31
(Cont'd)

II TRUCK BODY TYPES (Cont'd)		<u>R</u>	<u>Equation</u>
6.	SU Dump Lt, Med, Lt-Hvy	.9263	GVW = 2.55 EVW + 289
7.	SU Dump Hvy	.5348	= 1.25 EVW - .06 (EVW) ² +27,056
	a. SU Dump, Hvy 3 or more axles	.8895	= 9.29 EVW -10,745
8.	SU liquid Tanker	.9012	= 1.94 EVW + 5,521
9.	SU Concrete Mixer	.8237	= 7.13 EVW -32,945
10.	TT Platform	.5995	= 3.33 EVW +16,401
11.	TT Van	.1895	= 1.34 EVW +44,661
	a. TT Van, 3 Axle	.8711	= 3.41 EVW +10,833
12.	TT Dump	.8882	= 1.03 EVW +54,329
13.	TT Liquid Tanker	.2413	= .55 EVW +53,645

(Note: Approximately 84 percent of the trucks are listed as the above type)

III TRUCK LENGTH		<u>R</u>	<u>Equation</u>
1.	SU Less than 10 ft	.9823	GVW = 3.85 EVW -11,894
2.	SU 10-13 ft	.9121	= 1.46 EVW + 6,000
3.	SU 13-16 ft	.8203	= 1.93 EVW + 2,007
4.	SU 16-20 ft	.2352	= .84 EVW +13,150
5.	SU 20-28 ft	.7869	= 2.86 EVW - 6,637
6.	SU 28-36 ft	.6619	= 2.05 EVW +28,913
7.	TT 20-28 ft	.1755	=- .73 EVW +63,248
8.	TT 36-41 ft	.2057	= 1.06 EVW =48,089
9.	TT More than 41 feet	.3010	= 2.34 EVW +43,279

(Note: Approximately 50 per cent of the trucks are listed as the above lengths)

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

Based upon data available from existing data sources relating to truck movements in New York City and the Los Angeles Basin, it is not possible to formulate a single sampling plan which is applicable to both areas. Such a plan should permit the selection from their respective populations of trucks a representative, controlled sample which reflects adequately the truck driving patterns and usage dominant in each area. Sample plans with different descriptors do appear feasible.

In the Phase II portion of the program, 50 trucks in each area will comprise this sample. The trucks will have necessary sensors installed to provide data representative of certain physical factors describing their use patterns such as engine speed, wheel horsepower, vehicle speed, engine temperature and throttle-valve closure. Additionally, the on-board observer will be able to input into the instrumentation the road type and prevailing traffic conditions manually. One data scan of these variables is accomplished each 0.8 seconds. The data is converted approximately from analog sensor voltages to BCD and recorded on a magnetic tape for further data processing. The installation is calibrated so that these data can be translated to real terms of rpm, horsepower, mph, etc.

The instrumented vehicle is put into normal service by its owner/operator and monitored for one to five days. A total of 172 truck-days of data are to be accumulated in each area.

The recommended indicator of truck use is vehicle miles of travel (VMT), since this factor bears direct relationship to conventional emission factors for gasoline-powered motor vehicles (grams per mile or per kilometer). Therefore, it is evident that the sampling elements (selected survey vehicles) should be directly related to its representative contribution to total truck VMT in the sample area. The three basic properties of the sample plan must be:

- . The plan must relate to VMT;
- . Stratification descriptors must be found in the real world, viz., must be reflected in registration data or other selection source material; and
- . Variation in truck usage from day to day should be constant in each strata.

While it would have been desirable to employ identical descriptors to the samples of both New York and Los Angeles for obvious advantages of simplicity and ease of interpretation, such does not appear feasible under present conditions. Basically, the only factor of basic importance in the stratification descriptors is that they fit the above three properties. The sampling plan needs to fulfill the criteria of Phase II of the project, that of defining regional truck patterns and usage by operational mode. Therefore, mode descriptors does not play a role in sample plan design.

It is the conclusion of this part of the study than an adequate sample plan can be statistically designed around regionally available strata descriptors so that the trucks allocated

in the data for each region would minimize the variations between the estimate of vehicle use related to VMT and the actual use profile, as defined by divisions of truck usage patterns into periods of acceleration, cruise, deceleration, idle and other parameter.

APPENDIX A

SUMMARY OF DATA SOURCES LOS ANGELES BASIN

<u>DATA SOURCE</u>	<u>INFORMATION AVAILABLE</u>	<u>USE IN STUDY</u>
1. Origin-Destination Truck Surveys		
a) LARTS 1960 Truck Survey	Separate interview surveys for regular commercial and for-hire trucks. Trip data: axles and weight. Trip data: origin-destination, land use, commodity type and weight, and total daily mileage.	This source provides the basis for determining the essential characteristics of truck use throughout the Los Angeles Basin. The relationships developed can be applied to the present population of trucks in the region. Also, assignments to the Los Angeles traffic network aid in determining spatial distribution of truck use.
b) Les Hoel Thesis based on 1960 Truck Survey	Clarification of many significant truck-use relationships. Concentrated mainly on for-hire trucks for the purpose of developing a truck-trip distribution model. Also, quality of surveys was carefully evaluated.	The thesis established the potential usefulness of the 1960 Truck Survey for this study. The thesis augments the analysis of both the regular commercial and for-hire truck surveys.
c) 1967 Household Survey	Truck Driver trips and trip purposes.	Not sufficiently stratified for use in this study.

APPENDIX A (Cont '3)

LOS ANGELES BASIN

DATA SOURCE

INFORMATION AVAILABLE

USE IN STUDY

2. Motor Vehicle Registration Files

California Department of Motor Vehicles annual "Gross Report" (historical and present)

Data are available on both regular commercial and for-hire truck components by body type, weight class, engine type and number of axles.

Three major uses: Comparison of 1959 records and 1960 survey results (the 1960 survey sample was taken from the 1959 registration data); analysis of trends; and application of significant truck-use relationships to the present population of trucks.

3. Roadside Vehicle Classification Surveys

- a) 1963 and 1970 manual truck classification counts (California Division of Highways)

Representative samples of truck combinations on major roadways by number of axles (15 selected points within study area).

These data supplement the identification of the spatial distribution of truck-use within the region and by type of roadway.

- b) 1968 Truck Weight Study (California Division of Highways)

Representative samples of truck combinations on major roadways by gross and empty weight, by number of axles of each type of truck combination. Some comparisons with 1967. (Nine points within the study area, mainly on Interstate Highway System.)

These have been used in the same manner as in a). In addition, the weight data supplements the load carrying information obtained in the 1960 truck survey.

- c) 1971 Heavy Commercial Truck Survey (Survey conducted as part of the Commercial Vehicle Taxation in California Study by the Department of Motor Vehicles and Institute of Traffic Engineering.)

Representative samples of truck combinations on major roadways by axle and truck type, empty and gross weight class and inter-city origin-destination. (Six points within study area, mainly on Interstate Highway System.)

These data supplement the analysis of truck use on major routes in addition to providing data on inter-regional truck travel patterns.

TABLE A-1 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
AND AVERAGE MILEAGE PER TRIP

REGULAR COMMERCIAL VEHICLES

AXLE CLASS 2

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK														TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS/ TRUCK
		1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+		
6,000-9,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	26.6 4640 24.7	13.9 2963 15.1	11.9 2399 9.5	8.8 2385 9.6	6.5 1743 7.6	4.8 859 4.2	3.7 971 5.3	7.6 1492 2.6	4.8 733 1.8	4.0 822 2.9	2.5 763 3.9	2.3 431 2.2	.8 113 1.4	1.7 462 2.8	353	9.3
10,000-14,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	26.1 889 24.7	13.0 539 15.0	10.1 390 9.3	5.8 266 8.3	14.5 1025 10.2	4.3 208 5.8	4.3 229 5.5	4.3 161 2.5	10.1 399 3.2	2.9 73 1.8	0.0 0 0.0	2.9 0 1.6	0.0 0 0.0	1.4 16 .6	69	9.2
15,000-19,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	21.4 408 68.0	14.3 55 6.9	0.0 0 0.0	14.3 132 8.3	0.0 0 0.0	14.3 85 3.5	0.0 0 0.0	7.1 60 1.8	7.1 98 5.4	0.0 0 0.0	7.1 63 2.9	7.1 74 3.1	7.1 24 .9	0.0 0 0.0	14	10.1
20,000-24,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	100.0 27 6.8	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	2	1.5
25,000-29,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	100.0 122 20.3	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	1	6.0
30,000-34,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0	0.0
35,000+	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0	0.0
TOTAL	PER CENT TOTAL MILEAGE AVE. MILEAGE	26.7 5964 25.5	13.7 3557 14.8	11.4 2911 9.7	8.4 2783 9.4	7.5 2768 8.4	5.0 1152 4.4	3.6 1200 5.4	7.1 1713 2.6	5.7 1230 2.3	3.6 895 2.8	2.3 826 3.8	2.5 582 2.2	.9 137 1.3	1.6 478 2.4	439	9.3

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.
AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - 2 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
AND AVERAGE "1" TRIP PER TRIP

BOARD OF EQUALIZATION (B.E.) VEHICLES

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK														TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS/ TRUCK
		1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+		
6,000-7,999	PER CENT	13.3	10.2	11.1	9.7	7.5	3.5	5.3	13.7	8.8	4.0	4.9	2.7	4.0	1.3	226	16.7
	TOTAL MILEAGE	1371	1170	1568	1513	1037	657	826	2324	1885	708	815	379	837	146		
	AVERAGE MILEAGE	22.8	12.7	10.5	8.6	6.1	6.8	4.9	3.3	3.6	3.9	2.6	1.6	3.6	1.7		
10,000-14,999	PER CENT	15.6	9.4	18.7	6.3	15.6	3.1	9.4	3.1	6.3	0.0	6.3	3.1	3.1	0.0	32	13.3
	TOTAL MILEAGE	120	254	428	328	423	98	239	129	109	0	166	61	115	0		
	AVERAGE MILEAGE	12.0	21.2	11.9	20.5	8.5	8.2	5.7	4.3	1.8	0.0	3.8	2.5	4.4	0.0		
15,000-19,999	PER CENT	25.0	2.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	4	9.8
	TOTAL MILEAGE	30	7	3	0	85	0	0	0	0	0	0	87	0	0		
	AVERAGE MILEAGE	15.0	1.8	0.0	0.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0		
20,000-24,999	PER CENT	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	10.0
	TOTAL MILEAGE	0	0	0	0	250	0	0	0	0	0	0	0	0	0		
	AVERAGE MILEAGE	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
25,000-29,999	PER CENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
	TOTAL MILEAGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	AVERAGE MILEAGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
30,000-34,999	PER CENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
	TOTAL MILEAGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	AVERAGE MILEAGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
35,000 +	PER CENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
	TOTAL MILEAGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	AVERAGE MILEAGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
TOTAL	PER CENT	13.7	10.3	11.8	9.1	9.1	3.4	5.7	12.2	8.4	3.4	4.9	3.0	3.8	1.1	263	16.1
	TOTAL MILEAGE	1521	1431	1996	1841	1795	755	1065	2453	1994	708	981	527	952	146		
	AVERAGE MILEAGE	21.1	13.2	10.7	9.6	7.5	7.0	5.1	3.4	3.4	3.9	2.8	1.9	3.7	1.7		

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.

AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE 2 - 3 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
NUMBER AND AVERAGE MILEAGE PER TRIP

REGULAR COMMERCIAL VEHICLES

AXLE CLASS 3

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK											TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS/ TRUCK
		1-2	3-4	5-6	7-8	9-1011-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+
6,000-9,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	37.5 28 4.7	12.5 82 20.5	0.0 0 0.0	12.5 120 15.0	25.0 168 6.4	0.0 0 0.0	0.0 0 0.0	0.0 24 1.3	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	11.8 190 23.8	20.6 495 17.7	20.6 442 10.5	43.5 725 11.3	8.8 189 6.3	8.8 181 5.0	0.0 0 0.0	5.9 178 3.9	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
10,000-14,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	25.0 379 27.1	21.4 640 26.7	17.9 171 5.7	3.6 85 10.6	3.6 41 4.1	14.3 334 7.0	3.6 44 3.1	0.0 0 0.0	3.6 19 0.9	0.0 0 0.0	3.6 67 2.8	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	40.0 189 47.2	0.0 0 0.0	0.0 0 0.0	20.0 26 3.3	0.0 0 0.0	20.0 133 9.5	0.0 50 1.6	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
15,000-19,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	100.0 18 9.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	100.0 51 12.7	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
20,000-24,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	22.1 804 23.6	19.5 1268 21.1	15.6 613 8.5	14.3 956 10.9	7.8 398 6.6	9.1 515 6.1	2.6 177 6.3	5.2 268 2.9	1.3 24 1.3	1.3 19 0.9	0.0 67 2.8	0.0 0 0.0	0.0 0 0.0
25,000-29,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
30,000-34,999	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
35,000+	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
	PER CENT TOTAL MILEAGE AVE. MILEAGE	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0
TOTAL	PER CENT TOTAL MILEAGE AVE. MILEAGE	22.1 804 23.6	19.5 1268 21.1	15.6 613 8.5	14.3 956 10.9	7.8 398 6.6	9.1 515 6.1	2.6 177 6.3	5.2 268 2.9	1.3 24 1.3	1.3 19 0.9	0.0 67 2.8	0.0 0 0.0	0.0 0 0.0

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.
AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - 4 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
AND AVERAGE MILEAGE PER TRIP

AXLE CLASS 3 BOARD OF EQUALIZATION (B.E.) VEHICLES

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK																TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS PER TRUCK
		1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20 21-22 23-24 25-26 27+																	
		PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE	PER CENT TOTAL MILEAGE AVE. MILEAGE		
6,000- 9,999		5.3 260 130.0	0.0 0 0.0	36.8 440 10.5	21.1 433 13.5	0.0 0 0.0	5.3 42 3.5	0.0 0 0.0	21.1 373 3.0	10.5 149 4.1	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	19	19.3
10,000-14,999		18.8 952 36.6	24.6 1781 26.2	13.0 598 11.1	8.7 423 8.8	7.2 339 6.8	4.3 416 11.6	4.3 252 6.0	5.8 290 3.0	7.2 428 3.3	2.9 215 5.4	2.9 139 3.2	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	69	10.9
15,000-19,999		13.6 227 18.9	22.7 460 11.5	4.5 291 24.2	9.1 452 14.1	2.3 72 7.2	18.2 599 6.2	2.3 141 10.1	4.5 181 5.7	6.8 354 4.1	6.8 174 1.7	2.3 83 3.8	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	2.3 104 4.0	4.5 249 4.4	44	13.9
20,000-24,999		10.5 31 7.8	21.1 134 8.4	15.8 156 8.7	10.5 144 9.0	26.3 287 5.7	10.5 130 5.4	5.3 102 7.3	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	19	14.0
25,000-29,999		100.7 35 17.5	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	1	2.0
30,000-34,999		0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0	0.0
35,000+		0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	100.0 428 35.7	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	1	12.0
TOTAL		15.0 1505 32.7	20.3 2372 19.2	13.7 1485 11.8	10.5 1452 11.3	7.2 698 6.3	9.8 1615 9.0	3.3 495 7.1	6.5 844 3.3	6.5 931 3.7	3.3 389 2.7	2.0 222 3.4	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	0.0 0 0.0	153	13.1

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.
AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - 5 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE TRIPS
PER TRUCK, AND TOTAL AND AVERAGE MILEAGE PER TRIP

AXLE CLASS 4 +

REGULAR COMMERCIAL VEHICLES

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK												TOTAL NUMBER TRUCKS	AVERAGE NUMBER OF TRIPS PER TRUCK
		1-2	3-4	5-6	7-3	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+
6,000-9,999	PER CENT	66.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	102	0	75	0	0	0	9	0	0	0	0	0	0	0
	AVE. MILEAGE	25.5	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10,000-14,999	PER CENT	25.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	126	0	68	0	0	107	84	0	0	0	0	0	0	0
	AVE. MILEAGE	13.0	0.0	11.3	0.0	0.0	8.9	6.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
15,000-19,999	PER CENT	42.9	21.4	28.6	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	421	588	345	0	80	0	0	0	0	0	0	0	0	0
	AVE. MILEAGE	35.1	49.0	18.4	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20,000-24,999	PER CENT	15.4	23.1	23.1	7.7	7.7	7.7	11.5	3.8	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	742	142	753	146	120	398	351	137	0	0	0	0	0	0
	AVE. MILEAGE	92.7	14.2	20.9	9.1	6.0	16.6	8.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0
25,000-29,999	PER CENT	26.1	21.7	13.0	17.4	13.0	4.3	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0
	TOTAL MILEAGE	971	332	199	796	302	246	0	0	0	0	0	124	0	0
	AVE. MILEAGE	80.9	16.6	11.1	24.9	10.1	20.5	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0
30,000-34,999	PER CENT	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	232	539	0	0	0	0	0	0	0	0	0	0	0	0
	AVE. MILEAGE	58.0	67.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35,000+	PER CENT	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	TOTAL MILEAGE	213	0	0	0	0	0	0	0	0	0	0	0	0	0
	AVE. MILEAGE	116.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	PER CENT	29.3	21.3	20.0	9.0	8.0	5.3	5.3	1.3	0.0	0.0	0.0	1.3	0.0	0.0
	TOTAL MILEAGE	2727	1800	1440	944	502	751	435	137	0	0	0	124	0	0
	AVE. MILEAGE	62.0	48.1	16.0	19.7	8.4	15.6	7.8	8.6	0.0	0.0	0.0	5.2	0.0	0.0

(NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY,
AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
AND AVERAGE MILEAGE PER TRIP

AXLE CLASS 4

BOARD OF EQUALIZATION (B.E.) VEHICLES

WEIGHT POINTS	NOTE (1)	NUMBER OF TRIPS PER TRUCK														TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS PER TRUCK
		1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+		
6,000-9,999	PER CENT	0.0	0.0	86.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3	21.7
	TOTAL MILEAGE AVE. MILEAGE	0.0	0.0	82.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10,000-14,999	PER CENT	37.5	50.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8	9.3
	TOTAL MILEAGE AVE. MILEAGE	190	194	0.0	0.0	0.0	0.0	73	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
15,000-19,999	PER CENT	31.7	12.1	0.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23	5.8
	TOTAL MILEAGE AVE. MILEAGE	39.1	13.0	21.7	8.7	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
20,000-24,999	PER CENT	38.7	22.6	9.7	12.8	9.7	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34	8.5
	TOTAL MILEAGE AVE. MILEAGE	154	89	42.1	162	7.2	162	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
25,000-29,999	PER CENT	43.1	19.0	13.8	10.3	3.4	6.9	1.7	0.0	1.7	0.0	0.0	0.0	0.0	0.0	58	5.6
	TOTAL MILEAGE AVE. MILEAGE	5710	1638	917	1366	433	546	111	0.0	120	0.0	0.0	0.0	0.0	0.0		
30,000-34,999	PER CENT	42.1	26.3	0.3	10.8	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19	5.3
	TOTAL MILEAGE AVE. MILEAGE	1411	831	149	907	101	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
35,000*	PER CENT	70.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	3.2
	TOTAL MILEAGE AVE. MILEAGE	653	47	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
TOTAL	PER CENT	42.1	21.1	13.2	9.9	5.9	3.9	1.3	0.0	1.7	0.0	1.3	0.0	0.0	0.0	152	6.3
	TOTAL MILEAGE AVE. MILEAGE	10615	4240	2243	3225	925	928	104	0.0	120	0.0	106	204	0.0	0.0		

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.

AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - 7 100-2000 LBS DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
NUMBER AND AVERAGE TRIPS PER TRUCK, AND TOTAL
AND AVERAGE MILEAGE PER TRIP

		TOTAL ALL AXLE CLASSES																REGULAR COMMERCIAL VEHICLES	
WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK														TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS/ TRUCK		
		1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+				
6,000-9,999	PER CENT	27.2	13.7	11.8	8.8	6.9	4.7	3.6	7.4	4.9	3.8	2.5	2.2	.8	1.6	364	9.2		
	TOTAL MILEAGE AVE. MILEAGE	4770 24.1	3045 15.2	2474 9.6	2505 9.8	1911 7.6	859 4.2	971 5.3	1492 2.6	757 1.8	822 2.9	763 3.9	431 2.2	113 1.4	462 2.8				
10,000-14,999	PER CENT	21.5	15.0	14.0	11.2	12.1	6.5	3.7	4.7	6.5	1.9	0.0	1.9	0.0	.9	107	9.2		
	TOTAL MILEAGE AVE. MILEAGE	1105 24.0	1034 16.2	900 10.0	991 10.3	1214 9.3	496 5.9	313 5.6	339 3.1	399 3.2	73 1.8	0.0	77 1.6	0.0	.6				
15,000-19,999	PER CENT	28.6	19.6	16.1	5.4	3.6	10.7	1.8	3.6	1.8	1.8	1.8	3.6	1.8	0.0	56	7.2		
	TOTAL MILEAGE AVE. MILEAGE	1208 37.7	1283 29.2	516 9.6	217 9.0	121 6.0	419 5.8	44 3.1	100 2.0	98 5.4	19 .9	63 2.9	141 2.9	24 .9	0.0				
20,000-24,999	PER CENT	24.2	18.2	18.2	9.1	6.1	6.1	12.1	6.1	0.0	0.0	0.0	0.0	0.0	0.0	33	7.3		
	TOTAL MILEAGE AVE. MILEAGE	958 59.9	341 14.2	753 20.9	172 7.2	120 6.0	398 16.6	484 8.6	187 3.9	0.0	0.0	0.0	0.0	0.0	0.0				
25,000-29,999	PER CENT	28.0	20.0	16.0	16.0	12.0	4.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	25	5.7		
	TOTAL MILEAGE AVE. MILEAGE	989 70.6	332 16.6	321 13.4	798 24.9	302 10.1	246 20.5	0.0	0.0	0.0	0.0	0.0	124 5.2	0.0	0.0				
30,000-34,999	PER CENT	40.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5	3.2		
	TOTAL MILEAGE AVE. MILEAGE	232 58.0	590 49.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
35,000+	PER CENT	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	8.0		
	TOTAL MILEAGE AVE. MILEAGE	233 116.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
TOTAL	PER CENT	26.4	15.4	3.0	9.1	7.6	5.6	3.7	6.1	4.4	2.9	1.7	2.2	.7	1.2	591	8.7		
	TOTAL MILEAGE AVE. MILEAGE	9495 30.4	6825 18.2	4964 10.7	4683 10.8	3668 8.2	2418 6.1	1812 5.9	2118 2.7	1254 2.2	914 2.7	826 3.8	773 2.5	137 1.3	478 2.4				

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.

TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY.

AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE 4 - 8 LOS ANGELES DATA

TRUCK WEIGHT VERSUS
NUMBER OF TRUCKS, NUMBER AND AVERAGE OF TRUCKS
MAKING TRIPS PER TRUCK, AND TOTAL
NUMBER AND AVERAGE MILEAGE PER TRIP

TOTAL ALL AXLE CLASSES

BOARD OF EQUALIZATION (B.E.) VEHICLES

WEIGHT POUNDS	NOTE (1)	NUMBER OF TRIPS PER TRUCK														TOTAL NUMBER TRUCKS	AVERAGE NUMBER TRIPS PER TRUCK
		1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27+		
6,000-9,999	PER CENT	12.5	9.3	13.7	10.5	7.3	3.6	4.8	14.1	8.9	3.8	4.4	2.4	3.6	1.2	240	16.8
	TOTAL MILEAGE AVE. MILEAGE	1631 26.3	1170 12.7	2090 10.2	1946 9.4	1110 6.2	699 6.5	826 4.9	2897 3.3	2034 3.6	708 3.9	815 2.6	379 1.6	837 3.6	146 1.7		
10,000-14,999	PER CENT	19.3	22.0	13.8	7.3	9.2	3.7	6.4	4.6	6.4	1.8	3.7	.9	.9	0.0	109	11.5
	TOTAL MILEAGE AVE. MILEAGE	1262 30.0	2229 23.2	1026 11.4	751 11.7	762 7.6	514 10.7	504 5.8	419 3.3	537 2.8	215 5.4	305 3.5	61 2.5	115 4.4	0.0		
15,000-19,999	PER CENT	22.5	19.7	9.9	8.5	5.6	11.3	1.4	2.8	4.2	4.2	4.2	1.4	1.4	2.8	71	11.0
	TOTAL MILEAGE AVE. MILEAGE	954 29.8	645 11.5	915 21.8	674 14.0	246 6.1	599 6.2	141 10.1	181 5.7	354 4.1	174 1.7	269 4.1	87 3.6	104 4.0	249 4.4		
20,000-24,999	PER CENT	27.5	21.6	11.8	11.8	17.6	7.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51	10.6
	TOTAL MILEAGE AVE. MILEAGE	1885 70.9	1123 25.5	577 16.0	912 19.0	769 8.5	512 10.7	102 7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
25,000-29,999	PER CENT	42.1	18.6	13.6	10.2	3.4	6.8	1.7	0.0	1.7	0.0	0.0	0.0	0.0	0.0	59	5.5
	TOTAL MILEAGE AVE. MILEAGE	5245 110.5	1638 37.2	937 19.5	1068 22.2	410 21.5	546 11.4	111 7.9	0.0	120 6.7	0.0	0.0	0.0	0.0	0.0		
30,000-34,999	PER CENT	42.1	26.3	5.3	15.8	5.2	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	19	5.3
	TOTAL MILEAGE AVE. MILEAGE	1411 88.2	811 40.5	149 24.8	967 40.3	101 10.1	0.0	0.0	0.0	0.0	0.0	0.0	204 8.5	0.0	0.0		
35,000+	PER CENT	63.6	18.2	9.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11	4.0
	TOTAL MILEAGE AVE. MILEAGE	653 41.6	430 51.8	50 8.3	0.0	0.0	428 35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
TOTAL	PER CENT	21.7	15.8	12.7	9.7	7.7	5.3	3.9	7.4	5.8	2.5	3.2	1.6	1.9	.9	568	12.7
	TOTAL MILEAGE AVE. MILEAGE	13641 55.5	8046 22.3	5744 13.1	6118 14.4	3418 7.8	3298 9.2	1744 5.7	3297 3.4	3045 3.5	1097 3.4	1389 3.0	731 2.4	395 3.7	2.8		

NOTE (1) PER CENT - PER CENT OF TRUCKS MAKING NUMBER OF TRIPS SHOWN.
TOTAL MILEAGE - TOTAL MILEAGE OF ALL TRUCKS WITHIN "NUMBER OF TRIPS" CATEGORY
AVE. MILEAGE - AVERAGE MILEAGE PER TRIP.

TABLE A - 9 LOS ANGELES DATA

TRUCKS BY WEIGHT AND AXLE CLASS

VERSUS

PER CENT TRUCKS BY MILEAGE INCREMENT, TOTAL TRUCKS AND
AVERAGE MILES PER TRUCK AND PER TRIP

REGULAR COMMERCIAL VEHICLES

AXLE CLASS	WEIGHT POUNDS	MILEAGE INCREMENT											TOTAL MILES	TOTAL TRUCKS	AVERAGE MILES		AVG M.P.H.	
															PER TRUCK	PER TRIP		
		0	20	40	60	80	100	120	140	160	180	200+						
2	6,000-9,999	15.0	25.2	21.5	14.4	10.8	4.0	3.7	1.4	.6	.8	2.5	20,776	353	59.9	6.3	21.7	
	10,000-14,999	31.0	27.5	15.9	20.3	10.1	5.8	1.4	0.0	1.4	0.0	4.3	4,272	69	61.9	6.7	23.0	
	15,000-19,999	7.1	28.6	14.3	28.6	7.1	7.1	0.0	0.0	0.0	0.0	7.1	999	14	71.4	7.1	24.2	
	20,000-24,999	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27	2	11.5	9.0	12.5	
	25,000-29,999	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	122	1	122.0	20.3	30.7	
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-	
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-	
TOTAL		14.6	25.7	20.3	15.7	10.5	4.3	3.4	1.1	.7	.7	3.0	26,196	439	57.7	6.4	21.9	
3	6,000-9,999	37.5	12.5	0.0	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0	422	8	56.7	7.5	18.4	
	10,000-14,999	0.0	8.8	41.2	14.7	20.6	5.9	5.9	2.9	0.0	0.0	0.0	2,400	34	72.6	6.2	19.6	
	15,000-19,999	17.9	14.3	17.9	7.1	21.4	14.3	3.6	0.0	3.6	0.0	0.0	1,820	28	67.0	8.7	22.7	
	20,000-24,999	0.0	20.0	20.0	20.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	398	5	71.6	8.7	18.4	
	25,000-29,999	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	1	12.0	9.0	13.5	
	30,000-34,999	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51	1	51.0	12.7	16.9	
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-	
TOTAL		11.7	11.7	27.3	11.7	18.2	9.1	7.8	1.3	1.3	0.0	0.0	5,109	77	65.4	8.4	20.3	
4+	6,000-9,999	0.0	0.0	33.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	177	3	59.0	16.1	16.6	
	10,000-14,999	0.0	25.0	0.0	25.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	285	4	71.3	4.6	10.3	
	15,000-19,999	7.1	21.4	7.1	21.4	7.1	7.1	0.0	7.1	0.0	0.0	21.4	1,434	14	102.4	28.1	35.0	
	20,000-24,999	15.4	3.8	23.1	15.4	7.7	0.0	11.5	0.0	3.8	3.8	15.4	2,988	26	114.9	15.6	25.5	
	25,000-29,999	0.0	17.4	13.0	13.0	4.3	13.0	8.7	4.3	0.0	0.0	26.1	2,572	23	129.2	22.2	15.6	
	30,000-34,999	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	25.0	771	4	192.7	64.2	38.5	
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	233	1	233.0	29.1	22.0	
TOTAL		6.7	12.0	16.0	17.3	6.7	6.7	6.7	2.7	4.0	1.3	20.0	8,860	75	118.1	18.9	26.7	
TOTAL	6,000-9,999	15.4	24.7	21.2	14.8	10.7	4.1	3.8	1.4	.5	.8	2.5	21,375	364	58.7	6.4	21.7	
	10,000-14,999	8.4	21.5	23.4	18.7	14.0	6.5	2.8	.9	.9	0.0	2.8	6,957	107	65.0	7.0	20.6	
	15,000-19,999	12.5	19.6	14.3	16.1	14.3	10.7	1.8	1.8	1.8	0.0	7.1	4,253	56	75.9	10.6	26.2	
	20,000-24,999	15.2	9.1	21.2	15.2	6.1	0.0	15.2	0.0	3.0	3.0	12.1	3,413	33	103.4	14.2	24.3	
	25,000-29,999	4.0	16.0	12.0	12.0	4.0	12.0	12.0	4.0	0.0	0.0	24.0	3,112	25	124.5	21.9	28.2	
	30,000-34,999	0.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	20.0	822	5	164.4	51.4	35.7	
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	233	1	233.0	29.1	22.0	
TOTAL		13.2	22.2	20.6	15.4	11.0	5.2	4.4	1.4	1.2	.7	4.7	40,165	591	68.0	7.8	22.7	

TABLE A - 10 LOS ANGELES DATA

TRUCKS BY WEIGHT AND AXLE CLASS
 VERSUS
 PER CENT TRUCKS BY MILEAGE INCREMENT, TOTAL TRUCKS, AND
 AVERAGE MILES PER TRUCK AND PER TRIP BOARD OF EQUALIZATION (B.E.) VEHICLES

AXLE CLASS	WEIGHT POUNDS	MILEAGE INCREMENT											TOTAL MILES	TOTAL NUMBER TRUCKS	AVERAGE MILES		AVG. SPEED MPH
															PER TRUCK	PER TRIP	
		0	20	40	60	80	100	120	140	160	180	200					
2	6,000-9,999	12.0	17.3	18.2	20.0	12.0	7.6	7.1	2.7	.4	.9	1.8	15,236	225	67.7	4.0	17.5
	10,000-14,999	9.4	6.3	15.6	21.9	25.0	12.5	3.1	3.1	0.0	0.0	3.1	2,470	32	77.2	5.8	15.5
	15,000-19,999	25.0	25.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	209	4	52.2	5.4	14.6
	20,000-24,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	250	1	250.0	25.0	29.1
	25,000-29,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-
	TOTAL	11.8	16.0	17.6	19.8	14.1	8.0	6.5	2.7	.4	.8	2.3	18,165	262	69.3	4.3	17.6
3	6,000-9,999	10.5	10.5	5.3	21.1	21.1	15.8	5.3	0.0	0.0	0.0	10.5	1,697	19	89.3	4.6	20.1
	10,000-14,999	4.3	21.7	17.4	17.4	8.7	4.3	8.7	4.3	1.4	5.8	5.8	5,933	69	84.5	7.8	18.7
	15,000-19,999	11.4	20.5	13.6	13.6	15.9	4.5	4.5	4.5	2.3	2.3	6.8	3,387	44	77.0	5.5	14.0
	20,000-24,999	15.8	21.1	21.1	21.1	15.8	5.3	0.0	0.0	0.0	0.0	0.0	984	19	51.8	3.7	9.9
	25,000-29,999	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35	1	35.0	17.5	7.0
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	-
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	428	1	428.0	35.7	48.7
	TOTAL	6.5	20.3	15.0	17.0	13.1	5.9	5.9	3.3	1.3	3.3	6.5	12,364	153	88.8	6.2	16.6
4+	6,000-9,999	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	155	3	51.7	4.4	9.8
	10,000-14,999	0.0	37.5	12.5	25.0	12.5	12.5	0.0	0.0	0.0	0.0	0.0	457	8	57.1	6.2	10.9
	15,000-19,999	8.7	8.7	26.1	13.0	4.3	13.0	4.3	8.7	4.3	4.3	4.3	1,996	23	86.8	15.0	22.0
	20,000-24,999	3.2	12.9	3.2	3.2	9.7	19.4	0.0	9.7	6.5	6.5	25.8	4,746	31	153.1	18.0	22.9
	25,000-29,999	10.3	0.0	6.9	6.9	6.9	3.4	6.9	3.4	12.1	5.2	37.9	10,560	58	182.1	32.7	32.0
	30,000-34,999	5.3	5.3	10.5	10.5	0.0	15.8	0.0	10.5	0.0	10.5	31.6	3,643	19	191.7	36.4	31.2
	35,000+	0.0	20.0	40.0	0.0	0.0	0.0	10.0	0.0	10.0	0.0	20.0	1,133	10	113.3	35.4	24.8
	TOTAL	6.6	8.6	11.8	9.2	5.9	9.9	3.9	5.9	7.2	5.3	25.7	22,690	152	149.3	23.6	26.7
TOTAL	6,000-9,999	11.7	17.0	17.0	20.6	12.6	8.1	6.9	2.4	.4	.9	2.4	17,088	247	69.2	4.1	17.8
	10,000-14,999	5.5	18.3	16.5	19.3	13.8	7.3	6.4	3.7	.9	3.7	4.6	8,760	109	80.4	7.0	17.0
	15,000-19,999	11.3	16.9	16.9	12.7	14.1	7.0	4.2	5.6	2.8	2.8	5.6	5,592	71	78.8	7.1	16.1
	20,000-24,999	7.8	15.7	9.8	9.8	11.8	13.7	0.0	5.9	3.9	3.9	17.6	5,980	51	117.2	11.1	19.0
	25,000-29,999	10.2	1.7	6.8	6.8	6.8	3.4	6.8	3.4	11.9	5.1	37.3	10,595	59	179.6	32.6	31.6
	30,000-34,999	5.3	5.3	10.5	10.5	0.0	15.8	0.0	10.5	0.0	10.5	31.6	3,643	19	191.7	36.4	31.2
	35,000+	0.0	18.2	36.4	0.0	0.0	0.0	9.1	0.0	9.1	0.0	27.3	1,561	11	141.9	35.5	29.6
	TOTAL	9.5	15.2	15.3	16.2	11.6	7.9	5.6	3.7	2.5	2.6	9.7	53,219	567	93.9	7.4	20.2

TABLE A - 11 LOS ANGELES DATA

PER CENT TRUCK TRIPS BY GROSS WEIGHT AND AXLE CLASS
VERSUS

TRAVEL TIME AND NUMBER OF TRIPS

REGULAR COMMERCIAL VEHICLES

AXLE CLASS	WEIGHT POUNDS	TRAVEL TIME (MINUTES)											T		
												TOTAL NUMBER TRIPS	TOTAL	AVERAGE	
		0	10	20	30	40	50	60	70	80	90				100+
2	6,000- 9,999	41.0	26.3	12.4	9.0	4.7	1.7	2.5	.7	.2	.6	.8	57,394	3,296	17.4
	10,000-14,999	38.2	27.3	15.8	8.5	5.4	1.1	1.7	.2	.2	.8	.9	11,119	634	17.5
	15,000-19,999	30.5	36.9	17.0	8.5	4.3	0.0	.7	0.0	0.0	0.0	2.1	2,480	141	17.6
	20,000-24,999	0.0	0.0	0.0	33.3	33.3	33.3	0.0	0.0	0.0	0.0	0.0	130	3	43.3
	25,000-29,999	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	234	6	39.7
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	TOTAL AVERAGE	40.1	26.8	13.0	9.0	4.9	1.6	2.3	.6	.2	.6	.9	71,361	4,080	17.5
3	6,000- 9,999	10.7	37.5	21.4	16.1	5.4	0.0	5.4	1.8	0.0	0.0	1.8	1,367	56	24.4
	10,000-14,999	17.1	25.9	23.2	15.4	6.1	4.8	4.4	.3	.7	1.0	1.0	7,364	293	25.1
	15,000-19,999	26.8	28.7	22.5	7.7	2.4	2.4	4.3	1.4	0.0	1.0	2.9	4,815	209	23.0
	20,000-24,999	4.3	17.4	39.1	23.9	8.7	0.0	2.2	2.2	0.0	0.0	2.2	1,302	46	28.3
	25,000-29,999	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	80	2	40.0
	30,000-34,999	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	180	4	45.0
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	TOTAL AVERAGE	18.7	27.0	23.8	13.6	5.2	3.1	4.6	1.0	.3	.8	1.8	15,108	610	24.8
4+	6,000- 9,999	0.0	18.2	9.1	18.2	9.1	9.1	18.2	0.0	0.0	0.0	18.2	640	11	58.2
	10,000-14,999	32.3	17.7	12.9	17.7	6.5	0.0	3.2	1.6	0.0	6.5	1.6	1,670	62	26.9
	15,000-19,999	3.9	15.7	13.7	11.8	13.7	7.8	11.8	3.9	2.0	5.9	9.8	2,452	51	48.1
	20,000-24,999	3.7	31.9	20.4	14.7	12.0	2.1	3.7	3.1	.5	1.0	6.8	7,001	191	36.7
	25,000-29,999	8.2	13.4	13.4	9.7	16.4	6.0	11.9	3.7	3.0	5.2	9.0	6,296	134	47.0
	30,000-34,999	8.3	0.0	0.0	0.0	33.3	0.0	8.3	8.3	0.0	16.7	25.0	1,201	12	100.1
	35,000+	0.0	0.0	0.0	0.0	37.5	37.5	0.0	12.5	0.0	0.0	12.5	635	8	79.4
	TOTAL AVERAGE	8.7	21.3	15.6	12.8	13.6	4.3	7.2	3.4	1.3	3.8	7.9	19,895	469	42.4
TOTAL	6,000- 9,999	40.4	26.5	12.5	9.2	4.7	1.7	2.6	.7	.2	.6	.9	59,401	3,363	17.7
	10,000-14,999	31.5	26.3	17.8	11.1	5.7	2.1	2.6	.3	.3	1.2	1.0	20,153	989	20.4
	15,000-19,999	25.2	29.9	19.5	8.5	4.5	2.2	4.0	1.2	.2	1.2	3.5	9,747	401	24.3
	20,000-24,999	3.8	28.8	23.8	16.7	11.7	2.1	3.3	2.9	.4	.8	5.8	8,433	240	35.1
	25,000-29,999	7.7	12.7	12.7	11.3	19.0	5.6	11.3	3.5	2.8	4.9	8.5	6,614	142	46.6
	30,000-34,999	6.3	0.0	0.0	12.5	25.0	0.0	18.7	6.3	0.0	12.5	18.7	1,381	16	86.3
	35,000+	0.0	0.0	0.0	0.0	37.5	37.5	0.0	12.5	0.0	0.0	12.5	635	8	79.4
	TOTAL AVERAGE	34.8	26.3	14.5	9.9	5.7	2.0	3.0	.9	.3	.9	1.6	106,364	5,159	20.6

TABLE A - 12 LOS ANGELES DATA

PER CENT TRUCK TRIPS BY GROSS WEIGHT AND AXLE CLASS

VERSUS

TRAVEL TIME AND NUMBER OF TRIPS

BOARD OF EQUALIZATION (B.E.) VEHICLES

AXLE CLASS	WEIGHT POUNDS	TRAVEL TIME (MINUTES)											TOTAL NUMBER TRIPS	TRIP TIME MINUTES	
		0	10	20	30	40	50	60	70	80	90	100*		TOTAL	AVERAGE
2	6,000 - 9,999	48.6	27.5	10.2	6.8	3.4	1.0	1.4	.3	.1	.7	.4	51,618	3,771	13.7
	10,000 - 14,999	22.4	32.9	13.6	15.5	8.5	1.6	1.9	.5	.2	1.2	1.6	9,572	425	22.5
	15,000 - 19,999	10.3	38.5	28.2	10.3	10.3	0.0	0.0	0.0	0.0	0.0	2.6	866	39	22.2
	20,000 - 24,999	0.0	10.0	0.0	0.0	0.0	40.0	50.0	0.0	0.0	0.0	0.0	515	10	51.5
	25,000 - 29,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	30,000 - 34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	TOTAL AVERAGE	45.5	27.8	10.7	7.7	4.0	1.2	1.5	.3	.1	.7	.6	62,571	4,245	14.7
3	6,000 - 9,999	53.6	23.8	7.4	7.9	3.3	.5	1.6	.8	0.0	1.1	0.0	5,022	366	13.7
	10,000 - 14,999	21.8	25.7	20.1	12.4	7.6	2.3	4.7	1.6	.5	2.1	1.2	18,750	751	25.0
	15,000 - 19,999	26.0	20.9	17.5	19.8	7.4	2.6	3.3	.7	0.0	.8	1.1	14,382	612	23.5
	20,000 - 24,999	4.5	39.8	32.0	12.8	4.1	5.3	1.5	0.0	0.0	0.0	0.0	5,980	266	22.5
	25,000 - 29,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	300	2	150.0
	30,000 - 34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0
	35,000+	0.0	0.0	0.0	33.3	50.0	16.7	0.0	0.0	0.0	0.0	0.0	528	12	44.0
	TOTAL AVERAGE	26.4	25.6	18.4	14.0	6.5	2.5	3.2	1.0	.2	1.2	.8	44,962	2,009	22.4
4+	6,000 - 9,999	8.6	34.3	20.0	17.1	11.4	2.9	0.0	2.9	0.0	0.0	2.9	940	35	26.9
	10,000 - 14,999	27.0	6.8	14.9	10.8	13.5	1.4	14.9	0.0	2.7	5.4	2.7	2,520	74	34.1
	15,000 - 19,999	2.3	34.6	17.3	8.3	8.3	3.8	9.8	3.0	.8	2.3	9.8	5,448	133	41.0
	20,000 - 24,999	6.8	23.1	6.4	15.5	17.0	5.7	9.8	1.1	.8	3.4	10.2	12,428	264	47.1
	25,000 - 29,999	3.1	11.5	8.0	15.2	16.1	7.1	9.6	6.2	2.8	4.0	16.4	19,824	323	61.4
	30,000 - 34,999	3.0	6.0	4.0	25.0	10.0	4.0	8.0	5.0	0.0	8.0	27.0	7,000	100	70.0
	35,000+	0.0	0.0	6.3	18.7	25.0	3.1	15.6	0.0	0.0	0.0	31.3	2,745	32	85.8
	TOTAL AVERAGE	5.9	17.4	9.4	15.2	14.6	5.2	9.8	3.4	1.5	3.9	13.8	50,905	961	53.0
TOTAL	6,000 - 9,999	48.7	26.9	10.0	7.0	3.5	1.0	1.4	.4	.1	.7	.4	57,580	4,172	13.8
	10,000 - 14,999	22.3	27.0	17.6	13.4	8.2	1.0	4.3	1.1	.6	2.0	1.4	30,842	1,250	24.7
	15,000 - 19,999	21.2	24.1	18.0	17.3	7.7	2.7	4.2	1.0	.1	1.0	2.7	20,696	784	26.4
	20,000 - 24,999	5.6	31.1	18.9	13.9	10.4	6.1	6.5	.6	.4	1.7	5.0	18,923	540	35.0
	25,000 - 29,999	3.1	11.4	8.0	15.1	16.0	7.1	9.5	6.5	2.8	4.0	16.6	20,124	325	61.9
	30,000 - 34,999	0.0	0.0	4.5	22.7	31.8	6.8	11.4	0.0	0.0	0.0	22.7	3,273	44	74.4
	35,000+	34.9	25.8	12.7	10.4	6.1	2.1	3.1	.9	.3	1.3	2.4	158,438	7,215	22.0

TABLE A - 13 LOS ANGELES DATA

VEHICLE WEIGHT AND AXLE CLASS
VERSUSPER CENT TRIPS BY COMMODITY WEIGHT, TOTAL WEIGHT AND
NUMBER OF TRIPS, AND AVERAGE WEIGHT PER TRIP
(FOR ONLY THOSE TRIPS ON WHICH A COMMODITY WAS CARRIED)

REGULAR COMMERCIAL VEHICLES

AXLE CLASS	VEHICLE WEIGHT POUNDS	COMMODITY WEIGHT POUNDS x 1000											TOTAL WEIGHT POUNDS	TOTAL NUMBER TRIPS	AVERAGE WEIGHT PER TRIP
		0	5	10	15	20	25	30	35	40	45	50			
2	6,000-9,999	93.0	3.2	2.8	.8	0.0	0.0	0.0	0.0	.1	0.0	0.0	2,691,261	2,507	1,073
	10,000-14,999	92.1	3.4	3.2	.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	634,157	443	1,432
	15,000-19,999	99.1	0.0	0.0	.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64,910	109	596
	20,000-24,999	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10,000	1	10,000
	25,000-29,999	80.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7,454	5	1,491
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	TOTAL	93.1	3.2	2.8	.8	.2	0.0	0.0	0.0	.1	0.0	0.0	3,407,782	3,065	1,112
3	6,000-9,999	95.6	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70,255	45	1,561
	10,000-14,999	72.6	7.0	6.5	6.5	3.2	1.6	2.7	0.0	0.0	0.0	0.0	1,017,005	186	5,468
	15,000-19,999	70.1	6.6	8.0	2.2	5.8	5.8	.7	0.0	0.0	.7	0.0	845,865	137	6,174
	20,000-24,999	7.4	7.4	14.8	7.4	55.6	7.4	0.0	0.0	0.0	0.0	0.0	503,850	27	18,661
	25,000-29,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	TOTAL	69.9	6.1	6.8	4.8	7.3	3.3	1.5	0.0	0.0	.3	0.0	2,436,975	395	6,170
4+	6,000-9,999	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,500	1	4,500
	10,000-14,999	64.0	12.0	12.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	194,888	25	7,796
	15,000-19,999	50.0	8.8	8.8	11.8	8.8	2.9	0.0	5.9	2.9	0.0	0.0	382,521	34	11,251
	20,000-24,999	35.9	7.0	8.6	6.3	12.5	6.3	5.5	3.1	5.5	4.7	4.7	2,251,250	128	17,588
	25,000-29,999	43.5	3.5	4.7	3.5	5.9	4.7	4.7	1.2	1.2	7.1	20.0	1,861,863	85	21,904
	30,000-34,999	0.0	25.0	25.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	92,420	4	23,105
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	128,860	3	42,953
	TOTAL	41.8	6.8	7.9	5.7	8.6	4.6	4.3	3.2	4.3	4.6	8.2	4,916,302	280	17,558
TOTAL	6,000-9,999	93.1	3.2	2.8	.9	0.0	0.0	0.0	0.0	.1	0.0	0.0	2,766,016	2,553	1,083
	10,000-14,999	85.5	4.7	4.4	2.1	1.7	.5	.8	.3	0.0	0.0	0.0	1,846,050	654	2,823
	15,000-19,999	78.9	4.3	5.0	2.9	3.9	3.2	.4	.7	.4	.4	0.0	1,293,296	280	4,619
	20,000-24,999	30.8	7.1	10.3	6.4	19.9	6.4	4.5	2.6	4.5	3.8	3.8	2,765,100	156	17,725
	25,000-29,999	45.6	4.4	4.4	3.3	5.6	4.4	4.4	1.1	1.1	6.7	18.9	1,869,317	90	20,770
	30,000-34,999	0.0	25.0	25.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	0.0	52,420	4	23,105
	35,000+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	128,860	3	42,953
	TOTAL	86.6	3.7	2.6	1.6	1.6	.7	.5	.2	.4	.4	.6	10,761,059	3,740	2,877

TABLE A-14 LOS ANGELES DATA

VEHICLE WEIGHT AND AXLE CLASS
VERSUSPER CENT TRIPS BY COMMODITY WEIGHT, TOTAL WEIGHT AND
NUMBER OF TRIPS, AND AVERAGE WEIGHT PER TRIP
(FOR ONLY THOSE TRIPS ON WHICH A COMMODITY WAS CARRIED)

BOARD OF EQUALIZATION (B.E.) VEHICLES

AXLE CLASS	VEHICLE WEIGHT POUNDS	COMMODITY WEIGHT POUNDS x 1000											TOTAL WEIGHT POUNDS	TOTAL NUMBER TRIPS	AVERAGE WEIGHT PER TRIP
		0	5	10	15	20	25	30	35	40	45	50			
2	6,000-9,999	94.1	2.9	1.2	.7	.7	.1	0.0	.2	0.0	0.0	0.0	3,162,108	2,832	1,117
	10,000-14,999	59.3	6.8	10.7	9.2	13.9	0.0	0.0	0.0	0.0	0.0	0.0	2,195,079	337	6,514
	15,000-19,999	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15,280	30	509
	20,000-24,999	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	180,000	5	36,000
	25,000-29,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	35,000 +	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	TOTAL	90.3	3.3	2.2	1.6	2.1	.1	0.0	.3	0.0	0.0	0.0	5,552,467	3,204	1,733
3	6,000-9,999	78.9	2.6	7.0	1.8	5.3	0.0	1.8	1.8	0.0	.9	0.0	545,038	114	4,781
	10,000-14,999	32.9	6.7	4.3	6.5	22.8	18.9	4.8	.5	1.9	0.0	.7	6,637,263	417	15,917
	15,000-19,999	29.4	2.6	4.1	5.2	24.2	17.3	9.5	1.0	5.2	0.0	1.5	7,092,389	388	18,279
	20,000-24,999	3.7	2.2	3.7	4.5	38.8	45.5	1.5	0.0	0.0	0.0	0.0	3,114,950	134	23,246
	25,000-29,999	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	20,000	1	20,000
	30,000-34,999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0
	35,000 +	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	306,000	6	51,000
	TOTAL	32.6	4.2	4.4	5.2	23.4	19.5	5.8	.8	2.6	.1	1.4	17,715,640	1,060	16,713
4+	6,000-9,999	70.6	11.8	17.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54,265	17	3,192
	10,000-14,999	30.4	4.3	6.5	8.7	23.9	4.3	0.0	10.9	10.9	0.0	0.0	839,638	46	18,253
	15,000-19,999	69.1	1.1	5.3	3.2	4.3	4.3	8.5	1.1	1.1	0.0	2.1	820,908	94	8,733
	20,000-24,999	9.8	2.3	3.0	3.8	5.3	7.6	3.0	18.2	15.2	2.3	29.5	4,994,159	132	37,835
	25,000-29,999	7.9	2.3	4.5	2.8	2.3	6.2	3.4	2.8	10.7	15.8	41.2	7,020,882	177	39,666
	30,000-34,999	0.0	2.0	2.0	2.0	0.0	2.0	6.1	4.1	30.6	28.6	22.4	2,274,361	49	46,416
	35,000 +	0.0	0.0	15.0	10.0	10.0	0.0	25.0	5.0	5.0	0.0	30.0	817,007	20	40,850
	TOTAL	22.1	2.4	5.0	3.7	5.2	5.2	4.9	7.1	11.4	8.4	24.5	16,821,212	535	31,442
TOTAL	6,000-9,999	93.4	3.0	1.5	.8	.9	.1	.1	.2	0.0	.0	.0	3,761,411	2,963	1,269
	10,000-14,999	43.9	6.6	7.1	7.8	19.1	10.1	2.5	.9	1.6	0.0	.4	9,671,972	800	12,090
	15,000-19,999	40.8	2.1	4.1	4.5	19.1	13.9	8.8	1.0	4.1	0.0	1.6	7,928,577	512	15,486
	20,000-24,999	6.6	2.2	3.3	4.1	21.8	26.2	2.2	10.7	7.4	1.1	14.4	8,289,109	271	30,587
	25,000-29,999	7.9	2.2	4.5	2.8	2.8	6.2	3.4	2.8	10.7	15.7	41.0	7,040,882	178	39,556
	30,000-34,999	8.0	2.0	2.0	2.0	0.0	2.0	6.1	4.1	30.6	28.6	22.4	2,274,361	49	46,416
	35,000 +	0.0	0.0	11.5	7.7	7.7	0.0	19.2	3.8	3.8	0.0	46.2	1,123,007	26	43,193
	TOTAL	70.0	3.4	3.0	2.6	7.2	5.0	1.8	1.2	1.9	1.0	3.1	40,989,319	4,799	8,354

TABLE A - 15 LOS ANGELES DATA

VEHICLE TRIPS BY AXLE CLASS VERSUS

DESTINATION LAND USE CODE

REGULAR COMMERCIAL VEHICLES

AXLE CLASS	DESTINATION LAND USE (1)										TOTAL
	0	1	2	3	4	5	6	7	8	9	
2	553	629	112	2,298	176	223	303	179	8	235	4,716
3	81	39	3	224	23	32	117	81	2	66	668
4+	51	6	0	172	24	70	89	31	0	65	508
TOTAL	685	674	115	2,694	223	325	509	291	10	366	5,892

BOARD OF EQUALIZATION (B.E.) VEHICLES

AXLE CLASS	DESTINATION LAND USE (1)										TOTAL
	0	1	2	3	4	5	6	7	8	9	
2	329	683	127	1,504	303	499	760	302	7	316	4,830
3	49	315	20	127	72	122	376	826	2	375	2,284
4+	54	9	0	44	65	129	269	202	6	252	1,030
TOTAL	432	1,007	147	1,675	440	750	1,405	1,330	15	943	8,144

(1) Destination Code

0 - Other

1 - Residential

2 - Office Building

3 - Retail Store

4 - Wholesale

5 - Warehouse

6 - Manufacturing

7 - Construction

8 - Railroad Station

9 - Truck Terminal

TABLE A - 16 LOS ANGELES DATA

NUMBER AND DISTRIBUTION OF TRUCKS
BY NUMBER OF AXLESSOURCE: DERIVED FROM 1963 CLASSIFIED VEHICLE CENSUS,
CALIFORNIA DIVISION OF HIGHWAYS, JUNE 1964.

CORDON POINT NUMBER	TOTAL DAILY TRUCK VOLUME	PER CENT AXLE CLASS			
		2 AXLE	3 AXLE	4 OR MORE AXLES	
28	1,276	47	21	32	
29	1,790	30	22	48	
30	4,200	45	20	35	
31	4,240	52	21	27	
32	1,989	59	10	31	
33	1,600	50	7	43	
34	1,120	71	21	8	
35	2,108	69	14	17	
36	3,740	55	14	31	
37	7,060	57	13	30	
38	4,280	57	15	28	
39	7,200	51	19	30	
40	7,940	63	17	20	
41	4,900	53	13	34	
42	4,430	58	15	27	
43	4,200	51	16	33	
44	1,920	36	15	49	
45	1,790	44	13	43	
46	7,400	52	15	33	
47	16,500	52	15	33	
48	11,920	52	15	33	
49	12,600	51	11	38	
50	12,600	50	12	38	
51	1,100	72	12	16	
52	1,100	72	12	16	
53	2,620	72	12	16	
54	2,130	57	15	28	
55	7,600	49	16	35	
56	4,740	49	19	32	
57	2,400	79	6	15	
58	2,030	77	6	17	
59	3,050	38	26	36	
60	1,470	22	16	62	
61	4,450	19	13	68	
62	4,650	21	13	66	
63	1,130	14	9	77	
64	2,450	15	8	77	
65	2,740	74	15	79	
66	4,740	72	12	16	
67	2,480	66	17	17	
68	1,140	73	10	9	
69	1,440	72	13	15	
70	1,110	72	19	9	
71	40	50	25	25	
72	40	29	14	33	
73	48	59	24	17	
74	480	76	16	8	
75	267	79	9	12	
76	1,500	57	14	29	
77	1,430	51	12	37	
78	4,200	52	14	34	
79	4,180	60	17	23	
80	6,030	28	7	65	
81	6,030	28	7	65	
82	6,030	25	14	61	
83	6,030	26	15	59	
84	4,730	28	15	57	
85	1,990	28	15	57	
86	2,510	20	15	65	
87	2,810	20	14	66	
88	750	75	12	13	
89	1,490	51	9	40	
90	1,640	48	12	40	
91	5,180	54	18	28	
92	5,070	55	18	27	
93	7,620	63	14	23	
94	8,260	61	12	27	
95	7,480	60	13	27	
96	4,400	50	14	36	
97	7,900	44	15	41	
98	8,160	44	15	41	
99	13,850	55	17	28	
100	14,150	53	17	30	
101	14,150	53	17	30	
102	4,700	40	15	45	
103	7,300	39	12	49	
104	6,250	40	12	48	
105	6,950	40	12	48	
106	7,080	39	11	50	
107	7,000	38	11	50	
108	5,700	40	9	51	
109	4,600	44	9	47	
110	1,190	69	17	14	
111	7,740	50	20	30	
112	1,410	74	20	6	
113	1,600	63	19	18	

CORDON POINT NUMBER	TOTAL DAILY TRUCK VOLUME	PER CENT AXLE CLASS			
		2 AXLE	3 AXLE	4 OR MORE AXLES	
117	1,510	63	11	26	
118	4,220	50	20	30	
119	4,280	50	20	30	
120	1,000	67	17	16	
121	1,400	69	18	13	
122	780	77	12	11	
123	530	58	24	18	
124	720	58	19	23	
125	670	66	18	16	
126	1,720	51	24	25	
127	1,150	47	21	32	
128	620	73	15	12	
129	1,950	35	13	52	
130	355	70	15	15	
131	280	54	18	28	
132	1,950	56	18	26	
133	2,140	41	11	48	
134	2,150	47	16	37	
135	2,160	38	8	53	
136	1,800	69	11	20	
137	850	80	9	11	
138	1,440	69	20	11	
139	350	77	14	9	
140	1,300	62	27	11	
141	1,800	61	28	11	
142	1,550	71	21	8	
143	1,400	71	18	11	
144	7,400	69	18	13	
145	7,250	70	17	13	
146	860	81	9	10	
147	1,080	91	9	10	
148	1,200	79	10	11	
149	2,850	58	18	24	
150	2,070	63	16	21	
151	1,700	65	12	23	
152	1,400	69	11	20	
153	1,050	58	14	28	
154	9,500	48	17	35	
155	10,850	49	13	38	
156	8,100	48	12	40	
157	7,210	50	11	39	
158	4,480	58	10	32	
159	3,870	54	14	32	
160	250	84	8	8	
161	1,580	66	14	20	
162	1,750	68	15	17	
163	1,930	64	20	16	
164	1,730	64	20	16	
165	1,020	52	19	29	
166	740	55	15	30	
167	590	49	17	34	
168	2,890	38	20	42	
169	4,010	36	17	47	
170	3,970	36	17	47	
171	3,980	39	23	38	
172	3,300	36	24	40	
173	2,000	53	25	22	
174	2,230	50	24	26	
175	850	47	15	38	
176	900	48	18	34	
177	740	48	18	34	
178	1,840	30	9	56	
179	540	61	11	28	
180	900	67	13	20	
181	160	75	19	6	
182	180	75	19	6	
183	950	60	18	22	
184	680	65	18	17	
185	910	67	13	20	
186	820	55	17	28	
187	1,840	65	16	19	
188	1,270	65	13	22	
189	1,620	51	19	30	
190	1,400	58	19	23	
191	1,000	62	20	18	
192	690	65	20	15	
193	440	80	11	9	
194	360	81	8	11	
195	950	74	14	7	
196	650	77	14	9	
197	930	75	13	11	
198	750	74	18	8	
199	710	74	19	7	
200	630	76	11	13	
201	230	29	17	44	
202	330	61	24	15	
203	530	61	13	26	
204	5,920	48	14	38	
205	14,730	54	12	34	

CORDON POINT NUMBER	TOTAL DAILY TRUCK VOLUME	PER CENT AXLE CLASS		
		2 AXLE	3 AXLE	4 OR MORE AXLES
206	12,770	49	12	39
207	12,110	43	12	45
208	14,190	36	16	48
209	6,890	42	12	47
210	5,760	45	13	42
211	4,750	41	14	45
212	4,280	41	14	45
213	4,280	41	14	45
214	4,540	32	12	56
215	2,860	40	11	49
216	2,270	31	8	61
217	820	31	14	55
218	890	36	20	44
219	780	38	26	36
220	920	30	27	43
221	710	38	27	35
222	270	38	40	22
223	810	37	31	32
224	1,660	37	30	33
225	1,640	31	33	36
226	1,490	33	33	34
227	750	29	24	47
228	1,170	31	15	54
229	1,050	36	10	54
230	1,950	43	17	40
231	2,440	39	19	42
232	630	39	11	50
233	690	32	7	61
234	750	38	21	41
235	240	39	11	50
236	890	31	27	42
237	920	41	12	47
238	1,490	46	20	34
239	1,490	36	29	35
240	1,670	42	11	47
241	380	36	13	51
242	2,440	69	22	9
243	1,100	74	10	16
244	1,160	72	16	12
245	920	57	27	16
246	420	74	16	10
247	600	73	8	19
248	660	76	8	16
249	1,040	37	34	29
250	1,240	50	15	35
251	650	62	17	21
252	650	62	17	21
253	650	57	17	26
254	650	57	17	26
255	1,920	39	15	46
256	1,920	39	15	46
257	1,000	25	17	58
258	1,000	21	14	65
259	1,800	36	17	47
260	320	72	16	12
261	1,660	65	11	24
262	1,910	50	11	39
263	1,850	50	8	42
264	920	45	15	40
265	330	61	24	15
266	750	60	13	27
267	1,110	58	26	16
268	1,470	54	26	20
269	1,440	56	26	18
270	1,400	48	23	29
271	2,100	41	24	35
272	2,850	33	23	44
273	1,420	32	20	48
274	1,180	29	14	57
275	1,180	29	14	57
276	1,090	27	14	59
277	2,420	30	15	55
278	2,420	30	15	55
279	3,600	44	14	42
280	3,600	44	14	42
281	610	35	8	57
282	375	45	12	43
283	910	31	11	58
284	750	39	15	46
285	325	40	14	46
286	1,910	46	16	38
287	2,250	48	13	39
288	1,010	61	13	26
289	1,210	30	17	53
290	1,550	30	17	53
291	2,580	62	16	22
292	2,320	57	17	26
293	950	61	12	27

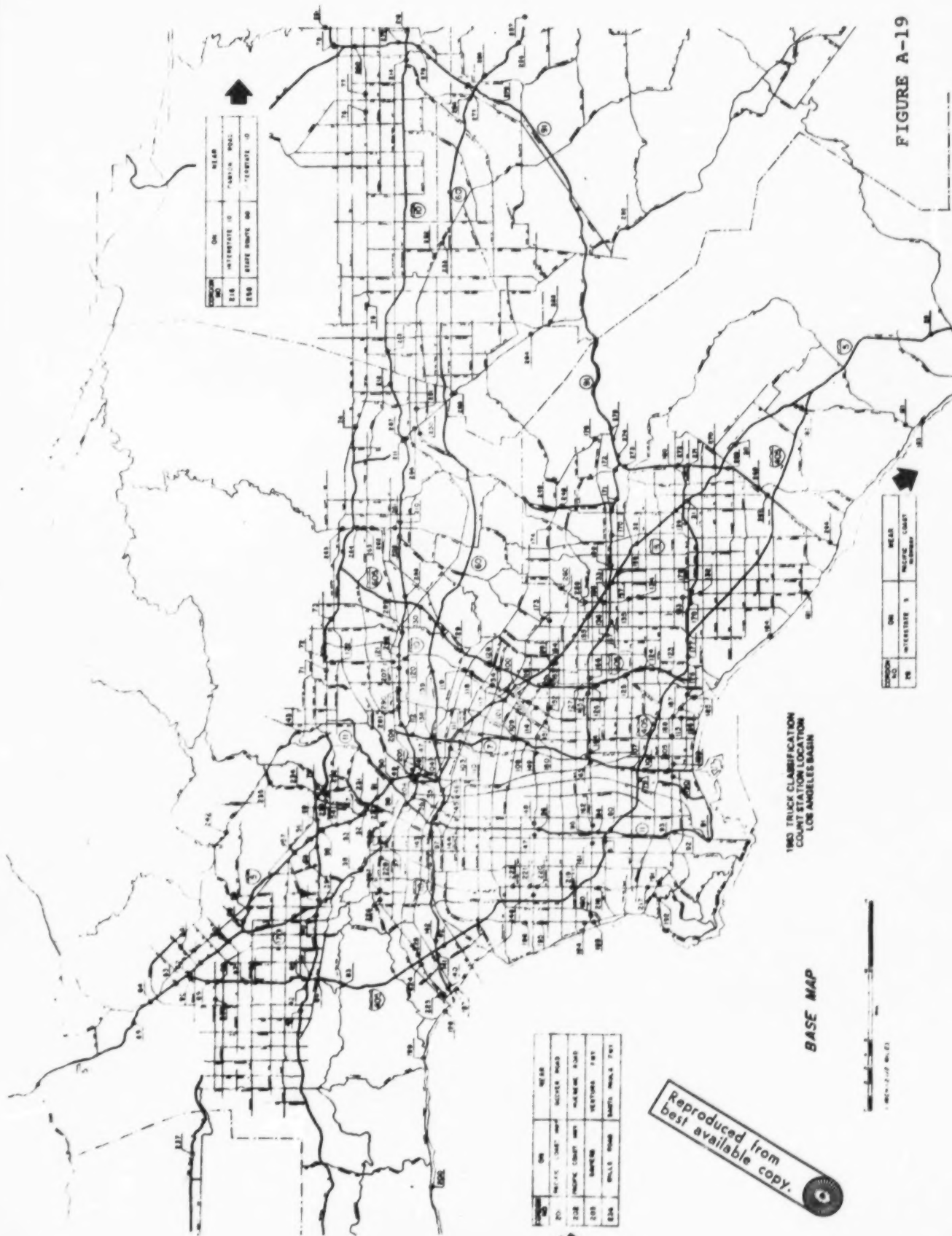


FIGURE A-19

CLASS	NO.	ON	INTEREST	NEAR
10	10	10	10	10
20	20	20	20	20
30	30	30	30	30
40	40	40	40	40
50	50	50	50	50
60	60	60	60	60
70	70	70	70	70
80	80	80	80	80
90	90	90	90	90
100	100	100	100	100

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BASE MAP

1963 TRUCK CLASSIFICATION
COURT STATION LOCATION
LOS ANGELES BASIN

CLASS	NO.	ON	INTEREST	NEAR
10	10	10	10	10
20	20	20	20	20
30	30	30	30	30
40	40	40	40	40
50	50	50	50	50
60	60	60	60	60
70	70	70	70	70
80	80	80	80	80
90	90	90	90	90
100	100	100	100	100

See instructions on reverse side

License Number _____

Sample Number _____

~~CONFIDENTIAL~~
For Statistical Summaries only.

VEHICLE TYPE: Light truck, pickup, panel, etc. ☐

Dual tired 2-axle and larger. ☐

Number of axles _____
(Entire rig)

Approximate unladen weight of
entire rig _____ lbs.

SPYGLASS READING: Beginning _____, ending _____

Number of times "4-level"
interchange used _____

DAY OF TRAVEL _____, Date _____

OFFICE USE
ONLYPLAIN POINT OF FIRST TRIP (0)

Arrival Time at Destination	Travel Time to Destination	Place of Destination (Intersecting streets, or street number, and place name)	Commodity Delivered at Destination		Land Use at Destination (See Corps at bottom of page)
			Type	Approx. Weight	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

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- B-1

17-0959

Destination Number	Arrival time at Destination	Travel Time to Destination	Place of Destination (Intersecting streets, or street number, and place name)	Commodity Delivered at Destination		Origin Point 0, 1, 2, etc.	Land Use at Destination (See Codes at bottom of page)	OFFICE USE ONLY
				Type	Approx. Weight			
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								

- | | | | | |
|--------------------|-----------------|------------------|---------------------|---------------------|
| 1. Residential | 3. Retail Store | 5. Warehouse | 7. Construction | 9. Truck Terminal |
| 2. Office Building | 4. Wholesaler | 6. Manufacturing | 8. Railroad Station | 10. Other (Specify) |

INSTRUCTIONS

Record origin and destination by street intersection or address, and place name, e.g., Hollywood and Vine, Hollywood.

A destination is a stop to pick up or deliver any part of a load. Omit other stops except the last stop for the day.

Describe commodity delivered by one or two words, such as man's suite, meat, gravel, general freight, etc. Estimate commodity weight only for the part of load delivered. If no delivery, leave the spaces blank.

The land use at destination may be given by the code number from the list at the bottom of the card. If code 10 (Other) is used, specify a one- or two-word description as—docks, oil field, farm, etc.

"b-level" interchanges before the junction of Harbor and Hollywood Freeways.

LOS ANGELES REGIONAL TRANSPORTATION STUDY - COMMERCIAL VEHICLE TRIP REPORT - INSTRUCTIONS

Check license number on reverse side of this form. Complete this form for that vehicle only. Do not give data for another vehicle.

If trip information cannot be completed, check one of the following reasons (and then fold and mail to Division of Highways):

- ☒ 6 Vehicle sold ☐ 5 Vehicle not operated in Counties of L.A., Ventura, Orange, San Bernardino, or Riverside ☐ 7 Vehicle demolished ☐ Other (Specify) Reason: _____
- ☐ 4 No record of vehicle ☐ 8 Vehicle not in use on travel day

For trip information details:

A destination is a stop to pick up or deliver any part of a load. Omit other stops (such as eat lunch) except the last of the day.

Record origin and destinations by street intersection or address and place name, e.g. Hollywood and Vine, Hollywood.

Describe commodity delivered by one or two words, such as men's suits, seat, gravel, general freight, etc. Estimate commodity weight only for the part of load delivered. If no delivery, leave the "Commodity Delivered" spaces blank. For the pickup point of the commodity delivered, use the destination number for the stop where this commodity was picked up.

For land use at destination, use the code number from the list at the bottom of the card.

If you do not understand how to prepare this form, or if you anticipate the truck will make more than 30 trips, please phone Madison 6-1515, Ext. 2756 - to 6 P.M., or after 6 P.M., please phone Madison 5-1984.

Summary data:

Travel day - Monday through Friday only and date (e.g. Monday, September 26) _____.

For entire rig: No. of axles _____. Approximate unladen weight (lbs.) _____.

Speedometer reading: Beginning of day _____ End of day _____.

Give the number of times that the Civic Center interchange (the 4-level structure at the junction of the Harbor and Hollywood Freeways) was used during the entire day _____.

Destination Number	Arrival time at Destination	Travel Time to Destination (Minutes)	Place of Destination (Intersecting streets, or street number, and city or place name)	Commodity Delivered at Destination			Land Use at Origin and Destination	OFFICE USE ONLY
				Type	Approx. Weight (Pounds)	or Pickup Point		
0	First Trip Origin →							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

(Put additional trips on back of form)

CHPS 17-5970

Land Use Codes

ee Place, point definition is underlined in the instruction.

- | | | | | |
|--------------------|-----------------|------------------|---------------------|---|
| 1. Residential | 3. Retail Store | 5. Warehouse | 7. Construction | 9. Truck Terminal |
| 2. Office Building | 4. Wholesaler | 6. Manufacturing | 8. Railroad Station | 10. Other (Specify) - e.g. dock, oil field, farm. |

420

Destination Number	Arrival Time at Destination	Travel Time to Destination (Minutes)	Place of Destination (Intersecting streets, or street number, and city or place name)	Commodity Delivered at Destination			Special Use at Destination	OFFICE USE ONLY			
				Type	Approx. Weight (Pounds)	Pickup Point					
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Special Use Codes

1. Residential
2. Office Building

3. Retail Store
4. Wholesaler

5. Warehouse
6. Manufacturing

7. Construction
8. Railroad Station

9. Truck Terminal
10. Other (Specify) - e.g. dock, oil field, farm.

(BEFORE MAILING, PLEASE FOLD ON THE PERFORATIONS AND STAPLE CLOSED)

FROM:

G60139 0006

HAROLD LOMMIE L
3552 E 53RD ST
MAYWOOD
CALIF. 97



BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 40003
LOS ANGELES, CALIFORNIA

TO:

DIVISION OF HIGHWAYS, DISTRICT VII
P.O. BOX 2304, TERMINAL ANNEX
LOS ANGELES, CALIFORNIA



APPENDIX C

Budget Bureau No. 41-66132; Approval Expires July 30, 1968

NOTICE - Response to this inquiry is required by law (Title 13 U.S. Code). By the same law, your report to the Census Bureau is confidential. It may be seen only by sworn Census employees, and may be used only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.

Form TC-200B
(11-18-67)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

1967 CENSUS OF TRANSPORTATION TRUCK INVENTORY AND USE SURVEY

INSTRUCTIONS

In correspondence pertaining to this report, please include State and license number.

Furnish make, year model, State, and weight of vehicle if not shown. If the license plates were on a vehicle other than the one described below give description of the vehicle currently registered.

Return the form to the Bureau of the Census, Washington, D.C., 20233, in the enclosed envelope which requires no postage, not later than twenty (20) days after receipt.

Please correct if name or address has changed

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1 VEHICLE IDENTIFICATION

Make	Year model	Registered weight or capacity	State	License No.
3	4	5		

2 OWNERSHIP OF VEHICLE

On July 1, 1967, were you the owner (or license holder) of the vehicle identified in item 1 (even though you may have sold, traded or otherwise disposed of it after July 1, 1967)?

1 ☐ Yes - Go to Question 3

2 ☐ No - Disposed of BEFORE July 1, 1967

When did you sell, trade, or otherwise dispose of the vehicle? _____ Month

If "No," sign on page 4 and return questionnaire

3. ACQUISITION OF VEHICLE

How did you acquire this vehicle?

1 ☐ Purchased new

2 ☐ Purchased used

3 ☐ Leased from someone else

4 BASE OF OPERATION

a What was the principal place from which the vehicle was operated?

CITY OR TOWN

County

8

State

9

b Was this vehicle operated almost entirely in the State named in 4a?

1 ☐ Yes

2 ☐ No

5. NUMBER OF TRUCKS, TRUCK-TRACTORS AND TRAILERS OPERATED FROM "BASE OF OPERATIONS"

How many trucks, truck-tractors, and trailers were you operating out of the city or town named in 4a as of July 1, 1967? (Report total number including the vehicle which you have been describing on this questionnaire.)

Trucks

Truck-tractors

Trailers (semi- and full-trailers)

Total

11

2

3

6 LEASED TO OTHERS WITHOUT DRIVER

During the past 12 months, did you use this vehicle MOSTLY for leasing or renting (without driver) to others?

1 ☐ No - Go to Q.7

2 ☐ Yes - Was this vehicle usually leased or rented for periods of:

1 ☐ Less than 30 days? - Go to Q.10

2 ☐ 30 days or longer? - Go to Q.7

7. MAJOR USE OF THE TRUCK OR COMBINATION (Mark (X) one box)

How was the vehicle mostly used during the past 12 months?

(If the vehicle was leased to someone else (without driver) for periods of 30 days or more, mark (X) the box that describes the business of the person or company to whom you leased the vehicle the longest time.)

16 ☐ 01 For personal transportation - Used in place of an automobile to go from home to work; for outdoor recreation; camping; fishing; etc. - Go to Q. 10

02 ☐ Own farm or ranch or other agricultural activity

03 ☐ In forestry or lumbering

04 ☐ In mining or quarrying

05 ☐ In construction

06 ☐ In manufacturing

07 ☐ In wholesale and/or retail

} Go to Q. 8

08 ☐ In utilities - telephone, electric, gas, etc.

09 ☐ In services - hotel, automobile repair, laundry, etc.

} Go to Q. 10

17 ☐ 10 For-hire transportation - Includes trucking services known as drayage, local cartage, household goods movers, common or contract motor carriers, commercial motor carriers, leased with driver, "owner-operators" under lease or contract.

If "For-hire" transportation has been checked, mark (X) one box below:

Is this service under an Interstate Commerce Commission authorization (either granted or pending)?

1 ☐ Yes

2 ☐ No

} Go to Q. 8

11 ☐ Other - If none of the above applies to the use you make of the vehicle, describe the main use of the vehicle here. If a product is hauled, answer Q. 8 next. If this is a service type vehicle, go to Q. 10

8. PRINCIPAL PRODUCTS CARRIED

Please mark (X) box which indicates product usually carried by this vehicle.

01 ☐ Farm products (fruit, grain, livestock, meat, poultry, dairy products, etc.)

02 ☐ Processed foods, beverages and tobacco

03 ☐ Primary metal products (ingot, billets, pipes, sheets, etc.)

04 ☐ Machinery or allied products

05 ☐ Transportation equipment (motor vehicles, trailers, boats, motorcycles, etc.)

06 ☐ Building materials (lumber, millwork, etc.)

07 ☐ Furniture, household appliances, or hardware

08 ☐ Chemicals, rubber, plastics or related products (including drugs, paints, fertilizers, etc.)

09 ☐ Petroleum or petroleum products

10 ☐ Scrap, refuse and garbage

11 ☐ Mixed cargoes

12 ☐ No products (used for repair, cranes, compressors, etc.) - Go to Q. 10

13 ☐ Other - Describe _____

9. ROUND-TRIP LOAD

On a round-trip basis, how does the truck or combination usually move? (Mark (X) one box only)

1 ☐ Loaded in one direction, but returns empty (or almost empty) in the other direction

3 ☐ Other - Describe _____

2 ☐ Loaded in both directions

10. VEHICLE MILES

Please give speedometer (odometer) reading or if not indicated by speedometer, give your best estimate.

What were the total miles this vehicle was driven during the past 12 months and the total miles driven since new?

(If vehicle was idle for the year enter "None")

a. Total miles driven during past 12 months (If less than 12 months, estimate probable miles for year)

b. Total miles this vehicle has been driven since new

Miles

21

22

11. GROSS VEHICLE WEIGHT

Mark (X) one box that is nearest the total weight of this truck or combination when loaded to full capacity (gross vehicle weight in pounds)

01 ☐ Less than 6,000

06 ☐ 32,001 to 40,000

02 ☐ 6,000 to 10,000

07 ☐ 40,001 to 50,000

03 ☐ 10,001 to 19,500

08 ☐ 50,001 to 60,000

04 ☐ 19,501 to 26,000

09 ☐ 60,001 to 70,000

05 ☐ 26,001 to 32,000

10 ☐ 70,001 and over

12. BODY TYPE - PICKUP AND PANEL TRUCKS**a. Does this truck have a pickup or panel body?**1 ☐ No - Go to Q. 132 ☐ Yes - Mark (X) the box in front of illustration of type and answer "b" and "c"1 ☐ Pickup truck2 ☐ Panel truck**b. Does this pickup or panel truck have 4-wheel drive?**1 ☐ Yes2 ☐ No**c. Is this pickup or panel truck equipped with a camper body or other special camping equipment?**1 ☐ Yes2 ☐ No

Sign certification on page 4 and return questionnaire

13. TYPE AND SIZE OF BODY (other than pickup or panel)

Mark (X) ONE box to describe the type of body of the truck or combination. If the power unit is a truck-tractor, report body type of the combination most frequently used with the power unit.

Body type

- 01 ☐ Multi-stop or walk-in
 02 ☐ Platform, stake, grain, flatbed or other platform type (with or without dumping device) including low bed and depressed center
 03 ☐ Cattle rack (hogs, calves, and other livestock)
 04 ☐ Insulated non-refrigerated van
 05 ☐ Insulated refrigerated van
 06 ☐ Furniture van
 07 ☐ Open top van
 08 ☐ All other enclosed vans
 09 ☐ Beverage

- 10 ☐ Garbage or refuse collector
 11 ☐ Winch or crane, other than wrecker
 12 ☐ Wrecker
 13 ☐ Pole or logging
 14 ☐ Auto transport
 15 ☐ Utility (body equipped for mobile repair and service, e.g., telephone line truck, electrical utility, etc.)

20 ☐ Dump truck or combination30 ☐ Tank truck or combination (for liquids)40 ☐ Tank truck or combination (for dry bulk)50 ☐ Concrete mixer60 ☐ Other body types - (If the above descriptions do not satisfactorily describe your vehicle, please enter identifying body type and size (or capacity).)

Mark (X) ONE box to indicate length of load space or capacity for all types except garbage or refuse collector, winch or crane, wrecker, pole or logging, auto transport and utility.

Body size

Length of load space (feet)

- 01 ☐ Under 10
 02 ☐ 10 and less than 13
 03 ☐ 13 and less than 16
 04 ☐ 16 and less than 20
 05 ☐ 20 and less than 28
 06 ☐ 28 and less than 36
 07 ☐ 36 and less than 41
 08 ☐ 41 or more

Do not specify body size for these types.

Capacity of dump (water level without side boards) (cubic yards)

- 09 ☐ Under 5 11 ☐ 7 to 9.9 13 ☐ 15 to 19.9
 10 ☐ 5 to 6.9 12 ☐ 10 to 14.9 14 ☐ 20 or more

Liquid capacity of tank (gallons)

- 15 ☐ Less than 1,000 19 ☐ 4,000 to 5,999
 16 ☐ 1,000 to 1,999 20 ☐ 6,000 to 7,999
 17 ☐ 2,000 to 2,999 21 ☐ 8,000 to 11,999
 18 ☐ 3,000 to 3,999 22 ☐ 12,000 or more

Dry bulk capacity (cubic feet)

- 23 ☐ Less than 300 26 ☐ 900 to 1,199
 24 ☐ 300 to 599 27 ☐ 1,200 to 1,499
 25 ☐ 600 to 899 28 ☐ 1,500 or more

Capacity of mixer (cubic yards)

- 29 ☐ Less than 6 31 ☐ 7 to 7.9 33 ☐ 10 to 11.9
 30 ☐ 6 to 6.9 32 ☐ 8 to 9.9 34 ☐ 12 or over

14. VEHICLE TYPE

30

Is this vehicle a single unit truck or is it a truck-tractor?

1 ☐ Single unit truck2 ☐ Truck-tractor**15. AXLE ARRANGEMENT**

31

Please mark (X) the box that illustrates the axle arrangement of this truck or truck-tractor with the trailing unit most frequently used with the power unit.

1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐

If none of the above applies, please indicate total number of axles on:

Truck or truck-tractor

Trailing unit(s)

Total axles

32

33

16. POWERED AXLES

34

How many driving (powered) axles does this vehicle have? (Report tandem axles as two axles.)

1 ☐ One2 ☐ Two3 ☐ Three4 ☐ Four or more**17. TYPE OF FUEL**

35

What type of fuel is used with this vehicle?

1 ☐ Gasoline2 ☐ Diesel3 ☐ LPG**18. AREA OF OPERATION**

36

Where is vehicle mostly operated?

Mark (X) one box only

1 ☐ Mostly in the local area (in or around the city and suburbs, or within a short distance of the farm, factory, mine, or place vehicle is stationed).2 ☐ Mostly over-the-road (beyond the local area) but usually not more than 200 miles one way to the most distant stop from the place vehicle is stationed.3 ☐ Mostly over-the-road trips that usually are more than 200 miles one way to the most distant stop from place the vehicle is stationed.**19. MAINTENANCE**

37

When major repairs are needed on this vehicle, are they usually done by:

1 ☐ Yourself?2 ☐ Truck dealer or factory branch?3 ☐ Own repair shop (set up specifically for maintenance)?4 ☐ Independent garage?5 ☐ Other? - Describe _____

Name of person to contact regarding this report

Address (number and street, city, state, ZIP code)

Telephone (include area code, number ext.)

CERTIFICATION - This report is substantially accurate and has been prepared in accordance with instructions

Signature of authorized official

Title

Date